September 1982

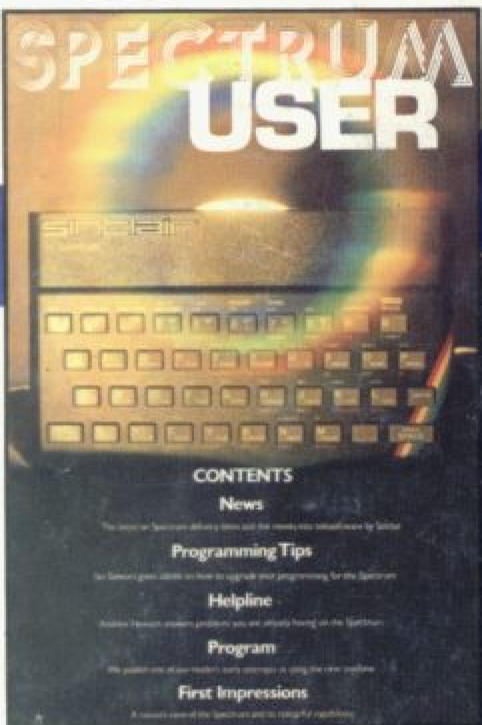
The independent magazine for the independent user

sinclair user

60p

Issue No 6

FREE INSIDE: SPECTRUM USER


SPECTRUM USER

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Sinclair User is published monthly by ECC Publications Ltd. It is not in any way connected with Sinclair Research Ltd.

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01-359 7481

If you would like to contribute to Sinclair User, please send typed (or beautifully hand-written) articles or programs to:
Sinclair User
ECC Publications,
30-31 Islington Green,
London N1 8BJ

We will pay £10 for each program printed and £50 for each article, which should be approximately 1,000 words long.

ISSN No. 0262-5458
Origination by
Outline Graphics.
Printed by
Eden Fisher (Southend) Ltd

Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411



NEXT MONTH

- **We look into the future and how microcomputers are likely to play a big part in our lives.**

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Home schooling is a dangerous dream

IN A RECENT interview Clive Sinclair said that the day would come when the computer replaced the school. He did not elaborate but said that computers would eventually become better teachers than human beings.

That conjures images of a special room in the home with a system permanently set up with a set of cassettes which have to be worked through. There would be examination cassettes which have to be completed in a set time for a qualification to be obtained.

With even Sinclair having sold into only two percent of the homes in Britain, it will be a long time before computerised home education is the most usual system throughout the country. It is, however, something which can be introduced gradually, with parents being offered the option of choosing traditional schooling or learning at home.

In the initial stages that could be expensive, as Government help to buy the necessary hardware would be needed, together with an investment in the cassettes. The cost would be on top of normal educational costs.

Once the home schooling idea was accepted, however, the costs of providing education would fall dramatically. Almost the whole of the present system would no longer be needed, with consequent savings in wages and building and maintenance costs. Teachers would be replaced by a handful of people responsible for setting and updating the cassettes and marking the examination cassettes. None of the thousands of anciliary staff — caretakers, cleaners and cooks — would be needed. School transport would become a thing of the past and crossing patrols would no longer halt traffic at the busy times of the day. Additionally, vast areas of land would become available for development.

Clive presumably visualises Sinclair Research playing a leading role in those developments. The ZX-81 has long been a favourite machine for introducing children to computers and their educational possibilities. The Spectrum has now received Government blessing by being placed on the Department of Industry Micros in Schools Scheme for primary schools.

Sinclair already provides a package of educational software and the moves into telesoftware will make the transmission of courses much easier. In addition, Sinclair has long had the declared intention of developing the educational side of its business.

With the first clues to the ZX-83 being that it will take Sinclair further up-market, that could be the one which will begin the move to home schooling. The only hints available so far are that it will have its own screen, using the flat screen developed for



the television set, use two of the forthcoming Microdrives, and be easily portable.

With the cost of hardware falling steadily, it would allow everyone at last to enjoy cheap, high-quality education in a form which is already achieving good results.

It all sounds too good to be true. It is.

Schools are much more than places for learning the subjects which appear in the curriculum. They are a major stage in learning social skills. All children make friends in their neighbourhood but most friends are made at school. They also gain by having contact with others from different backgrounds. There are sufficient problems in the world caused by a lack of understanding between groups of people without increasing the divisions by removing an effective way of bringing people together.

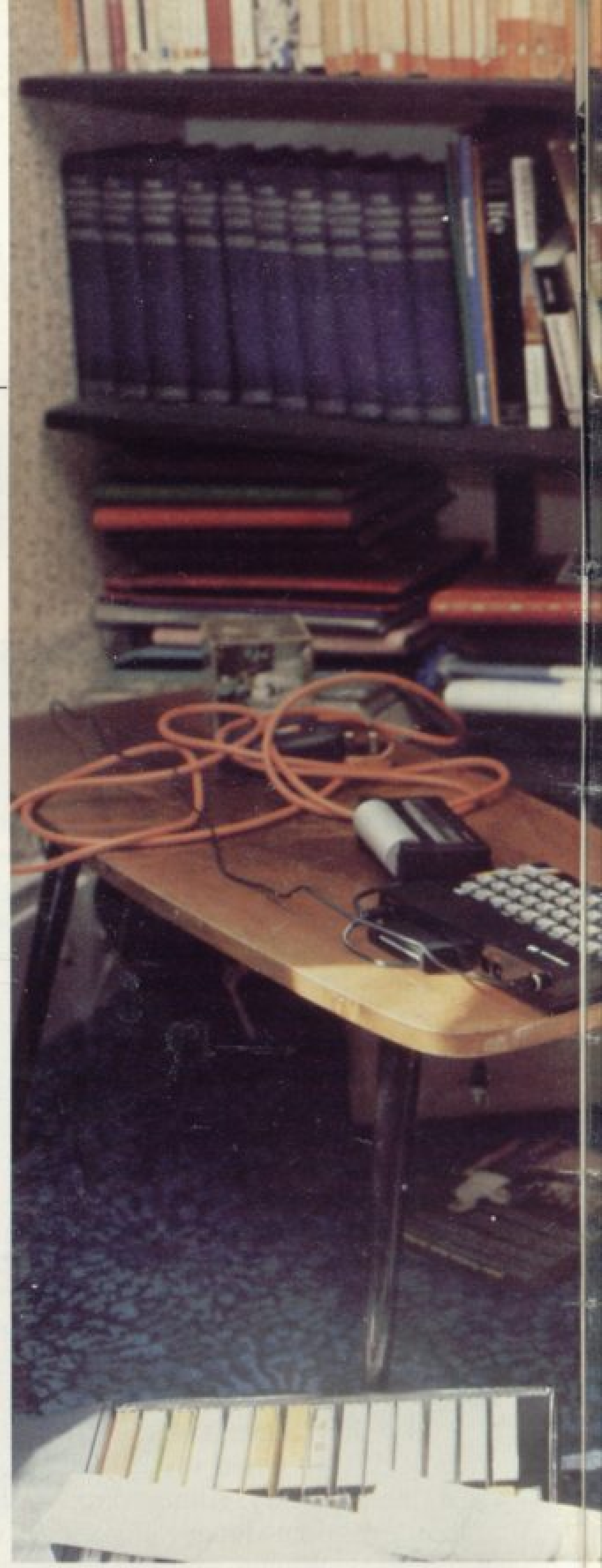
Human beings have achieved their development through being able to co-operate with each other, to do things which would have been impossible individually. Anything which reduces the ability to work together will work against that continued development.

With the swift advances which have already been made in computer-aided education, it is unlikely that the development will not continue. At the moment, however, the problems of transferring learning to the home seem too great to be surmounted.



In a rare spare moment, Eric Deeson speaks to Claudia Cooke.

The best man for the jobs



ERIC DEESON fixes you with a convincingly authoritative glare and announces: "In 10 years everyone will have a £10 computer and in 50 years there will be no need for schools". Such, he believes, will be the impact of computers on our lives and he finds the whole prospect exciting.

The 40-year-old science teacher, who happens to have written some 30 books and to be studying for his PhD, is forceful in his views — so forceful that my initial reaction was to wonder whether he might be an egomaniac.

He lives and breathes work and lets you know that he has a finger in almost every pie — because his fingers are the best for the job. The trouble was that after 90 minutes I believed him. I, too, was convinced there was no better person to fill the role of head of science and computing at Highgate School, Birmingham.

No better person to hold the five-year honorary post of editor of *Physics Education;* mind you, even Deeson admits that is "the biggest honour I have had in my life".

No better person to head the Educational ZX Users' Group, with its 1,500 members world-wide and its boast of having the largest Sinclair software library in the world.

No better person to act as consultant to so many people in the field of computing, or to lecture at their conferences, or to squeeze time for his own PhD on the side.

Certainly he is justified in having six computers in his home, although his three school-age children can be a problem when they are programming with a vengeance when he needs to use the machines.

Deeson is puzzled by the concept of holidays, free evenings and spare time; it is one of the few things he admits is not his forte.

"I don't think I'm in danger of having a nervous breakdown or anything; I have the right personality to cope with all that I do; but I admit that my family suffers; I don't give them enough time.

"Yet we have a really big, super-expensive family holiday about once every 18 months. Last time we went to the States and I thought I would hate it, taking no work with me, but I found I could still switch-off and I wasn't bored at all. I loved it.

"I never take a day off, even at weekends; there is just so much to do. I read computing books instead of novels and I rarely watch television — perhaps occasionally the news".

Deeson lives with his wife, a maths teacher, their children and a dog and a cat in a large, comfortable house in a leafy suburb of Birmingham. We know now about many of the things he does, but why does he do them all?

It all began in 1968. Deeson a graduate of Keele University in physics and economics, had trained as a teacher and was by then working as a teacher-trainer, a job to which he hopes to return one day.

"People did not see the applications for computers in education at that time but I could see they were beginning to influence our lives", he says. It was computer awareness which he found important, far more so than a grasp of the technical side.

By the late '60s, terminals were entering some schools and in 1969 Deeson wrote an article on the impact of computers in the next decade. He describes it as more of a sci-fi piece than anything else and even he could not have foreseen the microchip; but the potential even then was exciting, and it is the potential which still intrigues him.

"I much prefer teaching computer awareness courses. The examinations try to include technical facts as well as concepts but it becomes very difficult, because those facts are changing all the time.



but surprisingly he loved every minute of it.

"I enjoy responsibility and I like administration, too. I was in charge of hiring and firing, selecting pupils, arranging accommodation and all kinds of tasks. The beauty of it was that my bosses were thousands of miles away".

He enjoys the challenge of the classroom, too, and feels he has sufficient experience to be in control of almost any situation which might arise but he also knows that the traditional classroom scene may not be with us much longer.

"I am sure that within the next 50 years, perhaps less, schools will no longer be required. We will get away from the classroom with its one teacher and 30 children and find real freedom. I call it computer-assisted freedom".

"Obviously I do not want to see a police state but I think with computers that all the problems of discipline will disappear. I want the children to wander round the room, playing and talking to each other and enjoying their discoveries. It is all part of the learning experience".

Deeson is touching on the future of our educational system in his PhD but he is aware that, for the majority of teachers, projections even a decade ahead can seem little more than suspect and disruptive.

"When the Sinclair ZX-80 emerged it was very exciting because at last schools could have computers in sufficient quantity for them to explore. It was a very crude computer but it had advantages over the ZX-81 and the Spectrum because of its very simple range of facilities.

"The other two are very sophisticated but, particularly in junior schools, the keyboard is a problem. I believe Sinclair greatness lies in the fact that one key has so many functions".

Deeson owns all three Sinclair models, as well as a BBC home education machine and an Acorn Atom. They are indispensible to him for his work, enabling him to develop programs, write reviews and produce books. "It is really encouraging to find that my children and all their friends love playing with the computers. When the Spectrum arrived, I could not get my hands on it for two days.

"I find in school that most of the children are interested in the concept of computers, if not the technical side. It is the girls as well as the boys, although it is important to make sure the girls do not feel shy at the beginning because they feel the boys will know automatically what to do with a computer".

For three years, from 1975 to 1978, Deeson took his family when he went to Nigeria as principal of a teacher training college. There was no electricity, hence no computers,

"The majority of teachers, like the majority of people, still have no contact with computers. They do not think about the long-term implications; I do not think they want to but I don't think computers will go away".

Deeson, who is chairman of the West Midlands committee of the Association for Science in Education, has so much work outside his school job that it would be fair to assume he was planning to cease being a teacher soon. That is not so.

"Apart from the fact that I love teaching, there are all these changes on the horizon which will affect schools as much as anything else. The best part of it all is that I shall still be around to see them".



Although omitted from the Government support scheme, Sinclair is making an impact in schools. Keith Jammer investigates.

Cost boosts the use of ZX-81 in education



REPORTS are appearing that Sinclair Research has succeeded in its campaign for inclusion in the Micros in Schools Scheme.

The MIS scheme has always had its critics, among whom are, of course, Sinclair users. It has been claimed frequently by teachers that, despite the exclusion of Sinclair from the original scheme, there are more ZX-81s in use in schools than all other micros combined.

Cost is the reason as much as anything else; one can buy six ZXs for the price of the cheapest version of the machines in the scheme.

The inclusion of the Spectrum in the Government list of machines approved for support in primary schools is, of course, a victory for Sinclair and a recognition of commonsense arguments. Does it imply that Sinclair micros are not suited to work at secondary level and above?

I would like to reject that implication by looking at the educational uses of micros at all levels. The question to air must simply be whether the ZX range can cope with educational needs. If the machines can, their remarkable cheapness is an added bonus, in that several can be used instead of one larger machine.

Educational uses can be broken.-down into a number of categories:

- **Computer awareness** — the aim being to maximise familiarity with computers, their use, their uses and their abuses. Many schools include at least a few hours of such work in general courses followed by all pupils.
- **Computer studies** — the use of computer hardware as the apparatus of the formal examination-orientated computer science teaching.
- **Computer-assisted learning** — in which computer power is one of the many resources available for maximally-effective teaching in most subjects.
- **Administration** — with the computer aiding the general running of a school, as in the case of any other business.
- **Data capture and process control** — again helping, as in any other relevant business, with equipment interfacing.

Computer awareness concerns the provision of courses and experience designed to make all future citizens familiar with computers and their strengths and weaknesses. It is surely potentially the most important aspect of work in primary schools as well as at secondary level; all other applications affect only the minority of pupils but this is essential for every one.

It is also important in the sense that it can, and must, involve a large proportion of the staff of a school; at the moment there are surprisingly few teachers who know much about computers.

Computer awareness almost explicitly excludes hands-on experience and programming skills. Many schools with no computer power available have developed successful schemes of this nature in the last few years. It is a pity that happens and now there is no need to teach about computers without showing one in use.

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Which one to show in use? The 1K ZX-81 may be programmed to emulate every aspect of computing one may wish to discuss in awareness classes. The 16K ZX-81 or Spectrum, with printer, can do so even better and at more depth but the programs need more effort to write.

Courses of that level need to deal with such things as the principles of data processing, the databank, number-crunching, interfacing. Computing in situations such as hotel booking, banking, office work and the laboratory can all be modelled adequately and cheaply by the ZX micros.

Some computer awareness courses introduce programming, both as a logical concept and to provide the basis for voluntary computer club activities. The Sinclairs are peculiarly suitable for such work, being surely by far the best beginners' machines available. I am not certain if that applies to the Spectrum; the exceptional features of single key-word entry and syntax-checking mean that even seven-year-olds can quickly produce pleasing routines.

I still bemoan the demise of the ZX-80, in fact; it was remarkably effective even for advanced work and, of course, involved a less daunting task of keyboard familiarisation.

Having introduced the subject of computer club work, i.e., the unstructured playing with micros, I can note yet another area in which Sinclairs deservedly reign supreme. There is the added advantage that probably all schools have at least a few pupils by now with Sinclairs at home. The resulting facility of enabling school ideas to be developed at home is of great value. So too, conversely, is the possibility of upgrading school facilities with privately-owned equipment on loan.

'It has been claimed by teachers that there are more ZX-81s in use in schools than all other micros combined.'

Perhaps the best way of consolidating computer awareness is for the majority of teachers to use computers as a resource in their teaching.

That takes us to the broad important area of computer-assisted learning. The success and significance of Sinclair micros may be gauged from the facts:

- There are about 25 software houses specialising in ZX learning products; two of them, AVC Software and Rose Cassettes, are well-established and successful.
- The educational MUSE software Library — administered by EZUG — contains some 50 ZX cassettes, after only six months more than are available for any other micro.
- The first software and the first publication in the Spectrum market were both for education, both from AVC Software.

The majority of all those products can be classified as computer-aided learning material; between them they offer assistance in 12 school subjects. Eric Deeson of EZUG has estimated that a complete library of CAL programs covering the needs of children aged from five to 16 would need to contain upwards of 5,000 titles.

Any assessment of the validity of a given micro for education must rest in particular on its ability to cope with the formal needs of formal computing courses at CSE level and above.

Those needs are two-fold. First, the students have to undertake a fairly lengthy programming project, assessed as up to one-quarter of the marks for the examination. Second, they must have equipment available with which they can practise and explore the various concepts studied.



By kind permission of Griffin and George

There is little difficulty with the project; the student must demonstrate his programming ability and that will be restricted to some extent, whatever machine he uses. This year, for the first time, ZX-81s have been used for computing projects even at advanced level.

The equipment involved needs to be easy to use and readily available and must include a printer. The ZX is by far the best in that context as it meets the requirements so cheaply that schools can readily have a fair number of keyboards available. The aim must be at least one between each two students.

If one spends money on ZXs for formal school projects, one must be sure that they also meet the needs of the theoretical components of the course.

The ZX-81 is only just about suitable there. Its major lack is the ability to handle files meaningfully but its omission of direct READ . . . DATA, arguably unnecessary in real life but part of school syllabuses, and easy entry at machine-code level have also been quoted as precluding its effective use.

I would not go so far; with the ZX-81 one can emulate those facilities adequately enough to allow the necessary demonstration and exploration. Certainly many schools had no choice but to use this micro as the basis of much, if not all, of their practical work.

Still, we now have the Spectrum, easier to use and more versatile and reliable — and not much more costly. That is indubitably able to meet all formal school needs to advanced level and, once the Microdrive and network interfaces are available, is almost certain to become the main micro for everyday use in British schools.

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Tony Dutton looks at the expanding market for hardware add-ons available for primary and secondary schools.

Peripherals can boost uses in education

EASE OF USE and economic prices have put the ZX-81 at the top of the class, according to informed sources in the field of education. Reasonably-priced hardware must be the criterion when an education authority or buyer in the profession is buying a system. It must also be versatile and easy enough, too, for primary school and senior school use.

That permits more children to benefit from a number of economically-priced machines than only one more expensive type serving fewer students. Also the lower-priced systems release more money for peripherals, such as VDUs and printers. From the summer of 1981, just a few months after the introduction of the ZX-81, Sinclair had already planned to chalk-up the education market on its blackboard of success. Following that line of thought, it mounted a highly-successful subsidised computer purchase scheme for U.K. secondary schools. The result was that more than 2,300 schools took advantage of the offer to buy one ZX-81 and 16K RAM pack, each at half-price.

"In all, approaching 20,000 ZX-81s have been sold to schools, at normal and subsidised prices, making it the most widely-used computer in U.K. education. The company developed its commitment to the schools sector in November by sponsoring a special award scheme for ZX educational software," Sinclair said.



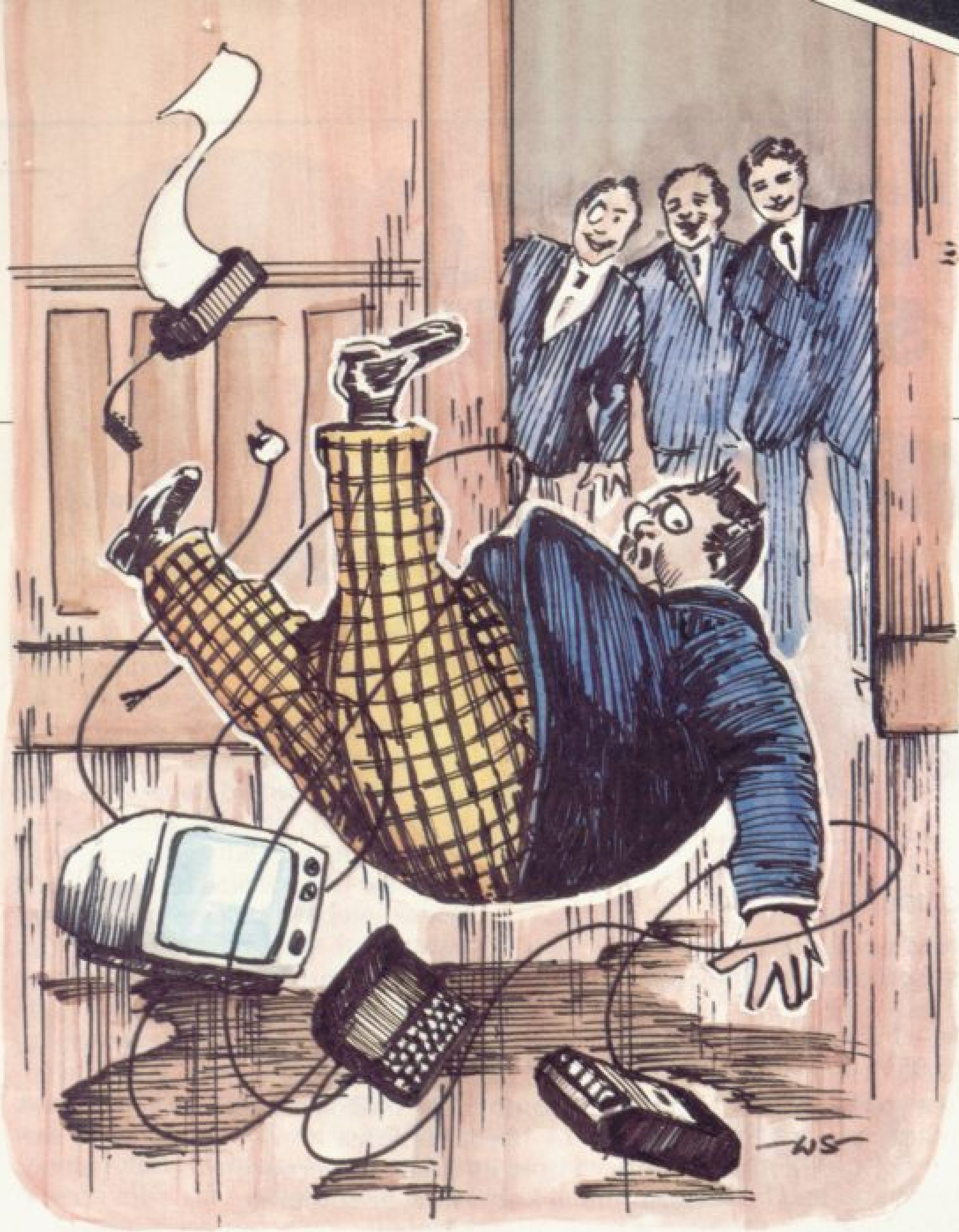
A range of the interfaces supplied by Griffin and George.

The company has also not been slow in developing, of all places, the Japanese educational computer hardware market. The ZX-81 is selling by mail order from Mitsui and through selected dealers to the key student market. The company projects sales of 20,000 units in the first full year and 50,000 in the second.

Peripherals for the ZX-81 for the educational market are limited and few, with the majority of the few being adequate for tutorial purposes. That is with the exception of the ZX printer offering full alpha-numerics across 32 columns and sophisticated graphics, if used by commerce students for operations such as printing ready-gummed labels.

The fault lies with the special aluminium-coated paper supplied with the unit. This situation, however, can easily be overcome by attaching a printer interface, allowing the system to operate a conventional printer. Nevertheless, that limitation does not outweigh a reasonable price of £59.95 inc VAT.

A very useful feature is the 8K basic ROM allowing flicker-free graphics. Although it is generally accepted that graphics play a small



part, if any, in school computer use, it is worthwhile to have available. Also for any ZX-80 systems in the classroom it is equally expedient, as a drop-in replacement chip. It is supplied with new keyboard template and operating manual. At £19.95 the chip provides all the features of the ZX-81 except graphics. If, however, a graphics facility is required on the ZX-81, the graphics mode function on the 40-key keyboard allows 20 graphical and 54 inverse video characters to be entered directly.

Recently Griffin & George introduced two new interfaces for the ZX-81. They interface the computer to external peripherals so that the system can talk to the outside world. Simple programs permit control of equipment, such as motors, lights and buzzers. Even conventional laboratory experiments can be monitored, data collected and manipulated by the ZX-81. Results can then be displayed in graphic or numeric form on the TV screen or printed-out permanently using the ZX printer.

Three interfaces are available. The first, the RAM-I/O Pack, plugs straight into the expansion port on the back of the ZX-81. It contains 4KB, so reasonably complex programs can be written without running out of memory space. In addition to that memory, the unit has a separate 8-bit input and 8-bit output port.

That port can be accessed directly from the ZX-81 Basic without the need to use the machine code routines to input and output information. The eight input and output lines, along with a + 5V and ground line, are taken to two independent 10-pin connectors on the rear of the module.

The output lines are capable of driving LEDs directly, so using the RAM-I/O enables traffic-light sequences to be produced with LED switches to be monitored and other electrical items to be controlled. The opportunity for experiments is enormous.

A second unit, called the Control Pack, contains eight relays each capable of switching 1A at up to 30V. The Control Pack uses mechanical relays, so the external circuitry is isolated from the ZX-81, with a high degree of protection provided for the computer. The unit plugs directly into the rear of the RAM-I/O Pack, from which it draws its power supply. All external connections, both input and output, are via 2mm. sockets.

The third in the range is an Analogue Pack. Again it plugs directly into the rear of the RAM-I/O Pack. The unit will convert an analogue input voltage in the range 0 to 2.55V to a digital signal to feed to the computer.

When outputting from the computer, it will convert a digital value from 0 to 255 to an analgue output in the range 0 to 2.55V. External connections to the Analogue Pack are via 2mm. sockets.

All three packs are housed in a robust plastic case. The Control Pack and Analogue Pack are used in conjunction with the RAM-I/O Pack and not on their own. Full operating instructions are supplied with each pack. Prices are CRA-720-H ZX-81 RAM-I/O Pack, £35-54; CRA-724-520D Analogue Pack, £18.69; CRA-724-54OU Control Pack, £28.05.

To keep together all ZX equipment in a neat working package, a desk console is supplied by G&G. It provides security, as all the pieces are stuck on the console, so that they are difficult to remove, and it can be seen at a glance that all equipment is present.



Desk console.

All pieces are stuck with double-sided tape, which prevents bad connections and prevents the equipment moving. The unit can also be transported easily between classrooms. The console accommodates a ZX-81 computer, 16K memory expansion unit, ZX printer, power supply, cassette recorder, cassettes, and pens and pencils. Electrical connections are made through the console via 3.5mm. jacks.



As the ZX-81 becomes more popular in education, more software is being written. Dave Sayers tests a sample.

Programs can help to brighten school-days



THE NUMBER of microcomputers in schools is growing rapidly in both the secondary and primary sectors. The increase in the use of micros in education has been stimulated by two things — the part funding of the purchase of computers by the Department of Education and Science and the many keen and interested heads of school and teachers who have introduced computing into their classrooms, often using their own machines and programs.

Yet there lies the irony; while machines were being bought there was little or no software available commercially which was written specifically for school use. The programs reviewed show that the need for software has been recognised and is being filled.

There are several points which have to be borne in mind; loading the programs has to be made as simple as possible and instructions should be clear and concise, in booklet form where necessary, with an explanation of what the program does and how it is operated, since instructions included as text are often sparse and uninformative.

The programs should run without bugs, use graphics if possible, and have interesting content together with excellent error-trapping.

Rose Cassettes sent six tapes for review, **Junior Maths 1 and 2, Junior English 1 and 2, Champion Quiz** and **Arithmetic** for the under-eights. Junior English 1 and 2 and Champion Quiz are all quiz type programs and as such, because of the limited content and vocabulary, largely unsuitable for regular classroom use.

Champion Quiz, however, is better than most of its type. Junior Maths 1 includes long multiplication and division, fractions 1 and 2 and two other programs. The level set is difficult but the children are taken through each stage of working the answer.

Junior Maths 2 includes areas, perimeters, sets and Venn diagrams, as well as two other programs. The standard of the tape is really very high, with good diagrams and instructions. It was, moreover, a winner with the children.

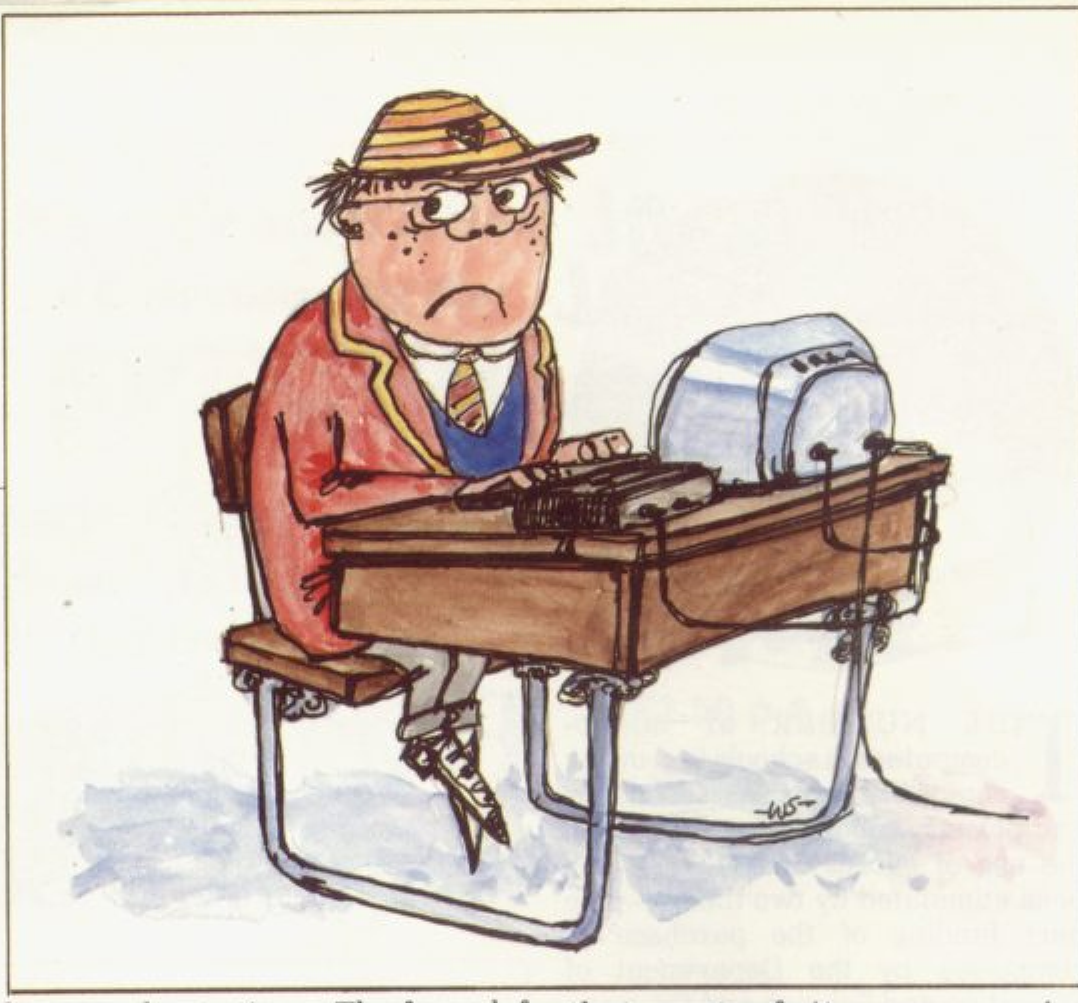
Arithmetic for the under-eights is a superb cassette, dealing with addition, subtraction, multiplication and division. The level can be set at units; tens and units; or hundreds, tens and units. The numbers are shown in large characters, well-suited to a classroom monitor, and carrying is illustrated on screen, in stages. A really good, worthwhile tape for classroom use, well put together and, like all the Rose software, properly error-trapped.

Junior Maths 1 and 2 and Arithmetic for the under-eights look like essential buys for any school using the ZX-81 in the classroom. I hope they will also be available for the Spectrum, too. The tapes cost £4.50 each and each cassette runs itself from loading.

The Fun to Learn cassettes, available from W H Smith and direct from Sinclair by post at £6.95 per cassette were the next to be examined. Eight titles were reviewed,

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English literature 1 and 2, History 1, Mathematics 1, Music 1, Inventions 1, Spelling 1 and **Geography 1.**

Spelling 1 is an interesting idea which unfortunately is not suitable for school use. Words are played from tape, listened to by the child and the child's spelling of the word is checked by the computer. The only trouble is that there are too many sets of words on each side of the cassette, 15 to be precise, and the time involved in searching for sets, as well as the fixed nature of the words, renders it unsuitable for schools. Nevertheless, any parent interested in helping a child with spelling should consider it.

Geography 1 is very good indeed, with two programs — cities and countries in Europe and towns in England and Wales. When run, the relevant maps appear, although borders in Europe are not marked. An atlas would help. The children enjoyed it and I felt it was useful to them, as it can teach them as well as quiz them. A good buy.

Mathematics 1 is a fairly ordinary mathematics tester. The Rose cassettes do the same job better, I feel, although this one deals with decimals as well.

Apart from Spelling 1, Geography 1 and Maths 1, the other programs are simple quizzes. That again renders them, on account of content and age level, unsuitable for schools. Geography 1 is very good value for money and highly recommended. All the programs were well error-trapped, although they did not run themselves from loading.

'Instructions were poor. Educational software should be supported by comprehensive instructions'.

ZX-81 Software, published by Brian Negus of 19 Westfield Drive, Loughborough, Leics, LEll 3QJ, has three music teaching cassettes on offer.

These cassettes were well error-trapped, two of them dealing with the various clefs and the third with beats and note times. The four clef programs cover alto and tenor/bass and treble. When run, notes appear one at a time on a short bar, which is suitably large for use on a classroom monitor; the graphics are very good. The children are then quizzed on the notes shown. A help facility is included.

Beats aims to teach children rhythm by having them follow moving graphics. In mystery beats the graphics are static and the children have to discover the beat for themselves.

As in Arithmetic for the under-eights the large graphics fit these programs well for use in front of a class. At £12 for three they must rank as good value, essential for music teachers. They also run themselves from loading, a good feature. Negus informs us that these programs will soon be available for the Spectrum.

AVC Software of PO Box 415, Harborne, Birmingham, B17 9TT submitted two programs for review, **Tables Countdown** and **Geography Hangperson,** at £3 per program. The programs are claimed to be completely error-trapped but one girl still managed to crash one when she typed RUN NEWLINE instead of GOTO 50. That was because, in using RUN, she cleared the variables loaded from the tape. I feel that AVC should reconsider that part of its programming policy,as one has to re-load the program to re-start it.

Tables Countdown is slightly expensive for what it does, as the Rose cassette arithmetic for the under-eights offers four programs of better presentation for £4.50, although a simple graphics reward is included. It tests the four rules, without help, at four levels of difficulty.

Geography Hangperson tests knowledge of locations in the British Isles with the aid of graphics clues. The locations are not well-thought-out and the contents of the program are limited but the clues are amazing — "Is there a town that makes frisbees, Sir? It looks like a man with his head on the wrong way round".

I cannot recommend either of those two programs for school use. There are better programs available and at lower cost. Although the AVC programs can produce a printout of scores, so can the Rose software, of which the children thought very highly, and so did I.

They were better thought-out and far more comprehensive than other products, with the exception of the Negus cassettes, which were also very good.

Loading in all cases was first-class and only proves that good cassettes are vital for easy loading. Cheap tapes just will not suffice.

Instructions were poor for all the programs reviewed; educational software really should be supported by comprehensive instructions in booklet form.

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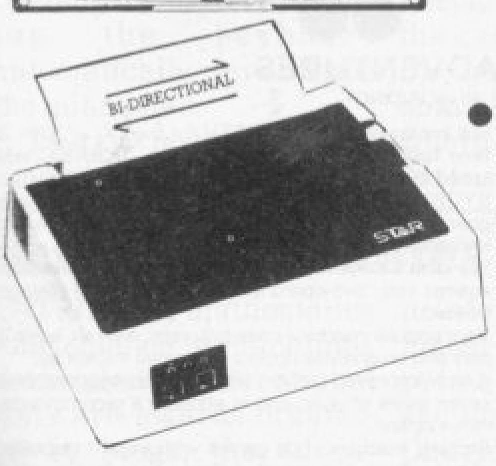
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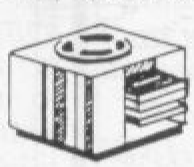


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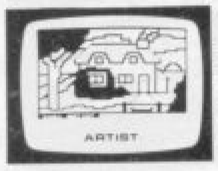
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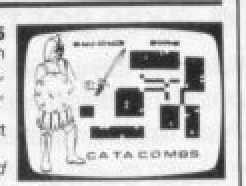


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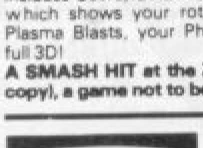




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A SMASH HIT at the ZX Microfair (most of the other software houses wanted a copy), a game not to be missed!





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FACES IN THE CROWD: Clive Sinclair, left, and Nigel Searle, head of Sinclair Research computer division, in the crowd of runners at the start of the Cambridge Festival half marathon. The men's race was won by Ian Thompson with Carol Gould coming first in the women's section.

ZX-81 price cut to keep sales

THE PRICE of the ZX-81 has been reduced to £49.95. It is believed that the move was prompted by the need to keep sales moving in Britain, since there has been a big fall in the number of orders since the announcement of the Spectrum.

It was felt that the gap between the prices of the ZX-81 and the Spectrum was not big enough. Sinclair Research has always maintained that there was a market for both machines.

It is also thought it is a reaction to the announcement by Binatone that it will be selling a micro costing less than £50. The machine is being imported from the Far East and the launch date depends on tests of the machine proving satisfactory. It is hoped to have it on sale before Christmas.

The ZX-81 will soon be available through more retail outlets. This follows the signing of an agreement with Prism Microproducts for sole distribution rights for the machine in Britain to small retail organisations with fewer than 20 outlets.

Prism is a sister company to ECC Publications which publishes *Sinclair User*. Its future plans include increasing its distribution of hardware and software items in the Sinclair market.

Add-on guarantee gamble

ANYONE attaching add-ons to their Sinclair machines which require opening the case or removing the keyboard automatically invalidates the guarantee.

That means that Sinclair is not obliged to repair the machine should anything go wrong. A spokesman for Sinclair Research said that once the case had been opened the guarantee no longer obtains but in some cases, where nothing had been disturbed inside, the repairs might still be free.

That came to light after a reader wrote to *Sinclair User* of his experience. PJ Shaw of Basingstoke Road, Reading wrote that, like many other ZX-81 owners, he had bought a full-size keyboard. The model required the removal of the computer board from its casing and fixing it into the new keyboard. It was a great improvement and Shaw was very happy with his machine.

"Then, one day, my ZX-81 developed a fault. Not to worry, it was fully guaranteed, or so I thought.

"According to Sinclair Research I had invalidated my guarantee by opening and removing the computer board from its casing," he said.

The necessary repair work will cost him a minimum of £20.

Science dominates contest

ENTRIES for mathematics and science applications dominated the educational software awards organised by Muse, the educational computing association. There were more than 100 entries but the science bias resulted in prizes being awarded in only five of the six categories.

Many of the entries have now been accepted into the ZX-81 section of the Muse library which, with nearly 50 programs, is now the biggest section.

Prizes of Sinclair printers went to Dave Fisher of Coventry in the primary maths/science section for **Bomber;** to Charles Rowbotham of Manchester under other primary for **Forensic;** under secondary maths/science to John McMullan of Stechford for **Forensic;** under other secondary to Richard Mariot of Kenilworth for **Bigspell;** and under other to Ian Souter of Tunbridge Wells for **TLOG.**

No award was made in the administration category.

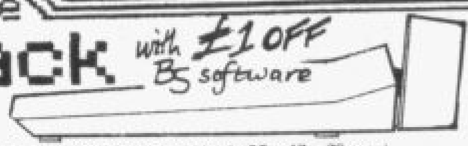
Winner of the Spectrum is announced

THE WINNER of the Spectrum and printer we offered in our June competition is S J Churchman of Blandford Camp, Dorset. From a high-quality entry the judges decided that his version of an EPROM blower was the best.

We will print an outline of the hardware and a review of its capabilities in our next issue.

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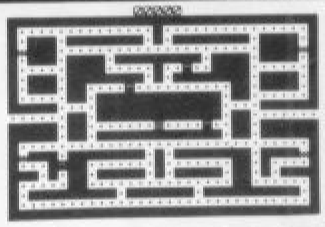
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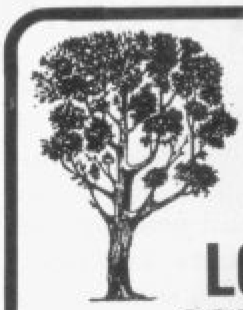
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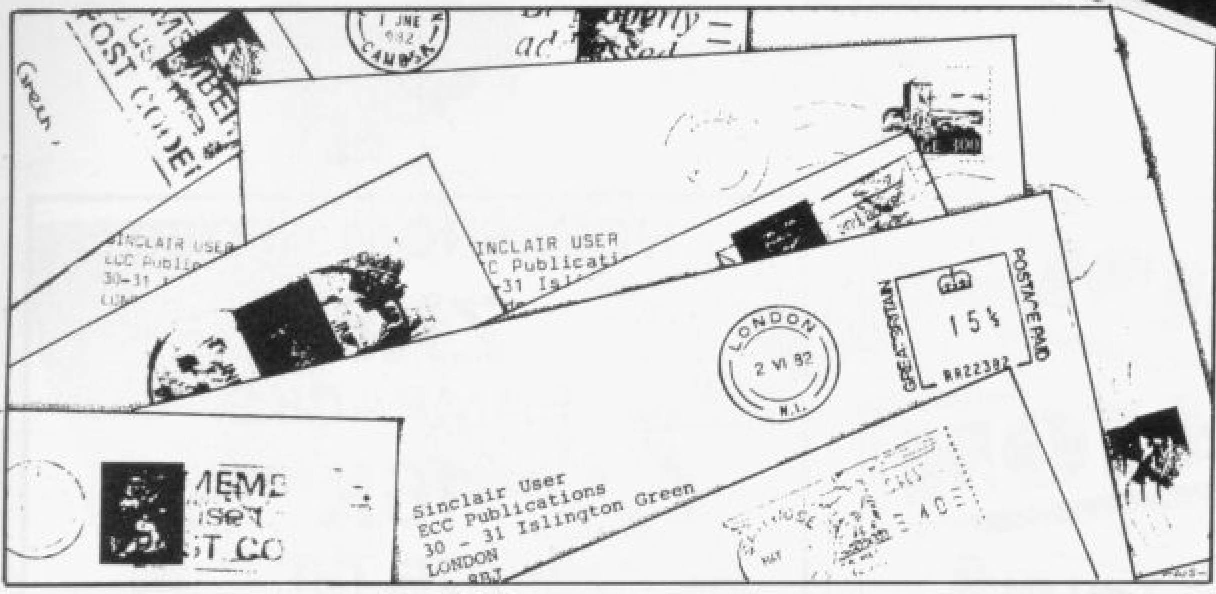
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Over-heating stops printer

MY ZX-81 with 16K and printer arrived in mid-May from Sinclair. After two days I stopped 16K RAM wobble by putting a large tea-tray into an old cushion cover. The ZX-81, RAM and printer live permanently on the tray and there has never been any further trouble with wobble.

Nearly every time I try to LLIST a long program, however, the power supply pack becomes very hot and eventually the printer goes dead, with white-out on screen. Moreover, it does not come alive again for several hours, i.e., until the power pack has cooled. This is no glitch or mains fluctuation. It happens at any time of day or night including 3 am — no K-cursor and no printer for several hours.

Since my RAM pack is now free from wobble — and anyway, without touching anything except to unplug from the wall socket, a memory test shows 16K available when switched on again after the cooling period — the fault can be ascribed only to the power pack, which seems unable to cope with the printer for LLIST of more than 1K programs.

My only solution at present is to copy long programs, screen by screen, with a long cooling period between each screen copy.

Marion Stubbs,
Southampton.

•*Sinclair Research says that it has never met this problem previously but thinks it might be due to a heat-sensitive component in either the mains adaptor or the computer. Do readers have other suggestions?*

Contact made with flicker

THANK YOU for the machine code survey but I make two points:

A tip? When typing-in programs if the machine is in FAST mode, the screen flicker tells one if a key has made "contact" more cheaply than buying beep systems — and just as effectively. The only thing is not to forget to revert to SLOW before SAVING, or you might produce a blank screen when the program is RUN.

I want to know more about what machine code does. I want a better feel of what an address means — not just jargon by way of definition. I want to get behind the feel of hex and the mnemonics so that I can understand what I am doing.

So how about some articles from people who can communicate their knowledge before I go out and buy another book? I want to be sure of understanding what I read.

Rev R J Redrup,
Truro, Cornwall.

•*Thank you for your comments on machine code and we will be trying to deal with the points you make in future editions.*

Better munch saves battles

MY SONS and myself enjoy *Sinclair User* both for articles and programs — which I input and they use. The **Monster Munch** by Tim Hartnell — May, 1982 — however, almost resulted in a full-scale war when one of them discovered how to escape from the maze.

If you are at either side of the board, you can escape using a two-part instruction, i.e., "NW". That transfers the 'H' to the E side of the board but the monster cannot follow. He is therefore safe so long as he travels "N" or "S". By adding the following, I cut off that escape route:

```
217 LET B$ = B$ +
  "(SPACE)"
218 IF B$ (2) = "E" AND
P>9 OR B$(2) = "W"
AND P<2 THEN GOTO 215
```

Now the monster always munches.

Harold Cather,
Yate, Bristol.

Appeal for pen-friend

I WOULD like a pen-friend who has a ZX-81 with whom I can exchange programs and other things. I can be contacted at Mollagatan 16, 50246 Boras, Sweden.

Magnus Nygren,

Mains filter advisers

WITH REGARD to Paul Coker's letter in the July issue of *Sinclair User*, Display Electronics has a mains filter which it recommends for computers. Further details obtainable from 64-66 Melfort Road, Thornton Heath, Croydon, Surrey. Tel. 01-689 7702.

T Dawson
Prestwick, Ayrshire.

WITH REFERENCE to the letter from Paul Coker on mains spike suppression, in July, what is required is a transient suppressor. They can be obtained from a radio dealer and are supplied by Radiospares; the mains version is code 238-457. It is a small component which requires soldering across the mains at the input to the transformer in the power supply unit, which must, of course, be disconnected from the mains before dismantling.

Although the loading of the Spectrum is far superior to the ZX-81, the Spectrum has a slight idiosyncrasy. You can have saved your programs on tape and loaded successfully many times when it apparently refuses to do so. The remedy is to ensure that your batteries are at full voltage; apparently when the voltage drops below the control voltage for the tape recorder motor stabilisation circuit, the speed of loading drops and the Spectrum notifies a tape loading fault. Replacing the batteries will cure the fault.

F Harrop,
Hollingbury,
Brighton.

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Come to the ZX-81 with a clear mind to make the best use of your new machine.

Lifetime's obsession can easily be acquired

BUYING a ZX-81 can be the start of a lifetime obsession with home computing. It is easy, however, to become discouraged if everything does not go to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the ZX-81 is to abandon any ideas for special uses. While the basic machine is ideal for learning how to use computers, it is too small for any major uses. It is better to become accustomed to the many facilities and then decide how you wish to ue them.

Begin by unpacking the machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for a second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

Once the K appears you are ready to begin learning about the ZX-81. It can save family arguments if you can afford a separate television set for your system. It also makes life easier if you can find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

The manual is written in great detail and is reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something which is important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are really ready but that is likely to lead to errors. For example, words like AND, THEN, and AT should not be typed-in letter by letter. By the time you have reached chapter 11, you should have accumulated sufficient knowledge to be able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important that when using the machine it is not jolted. Some of the connections can easily work loose and everything which has been put in will be lost.

The manual is not to everyone's taste and if you find it difficult to follow, a number of books on the market can help you. Find the one which suits you best.

As a way of relaxing, you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy. There are some programs for the unexpanded 1K machine but most of them require a 16K RAM pack. The tapes vary in quality. It is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about the ZX-81 is to plunge in at the deep end and see what the computer will do. Refer to the manual when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machine.

You may have heard already about the problem involved in SAVEing and LOADing your own cassettes. The mánual again gives detailed instructions but many of the early machines would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

They usually occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD" " followed by NEWLINE; then slowly increase the volume of the recorder with the tape running until the television screen shows four or five thick horizontal black bands. If you then re-wind the tape, the program should LOAD normally.

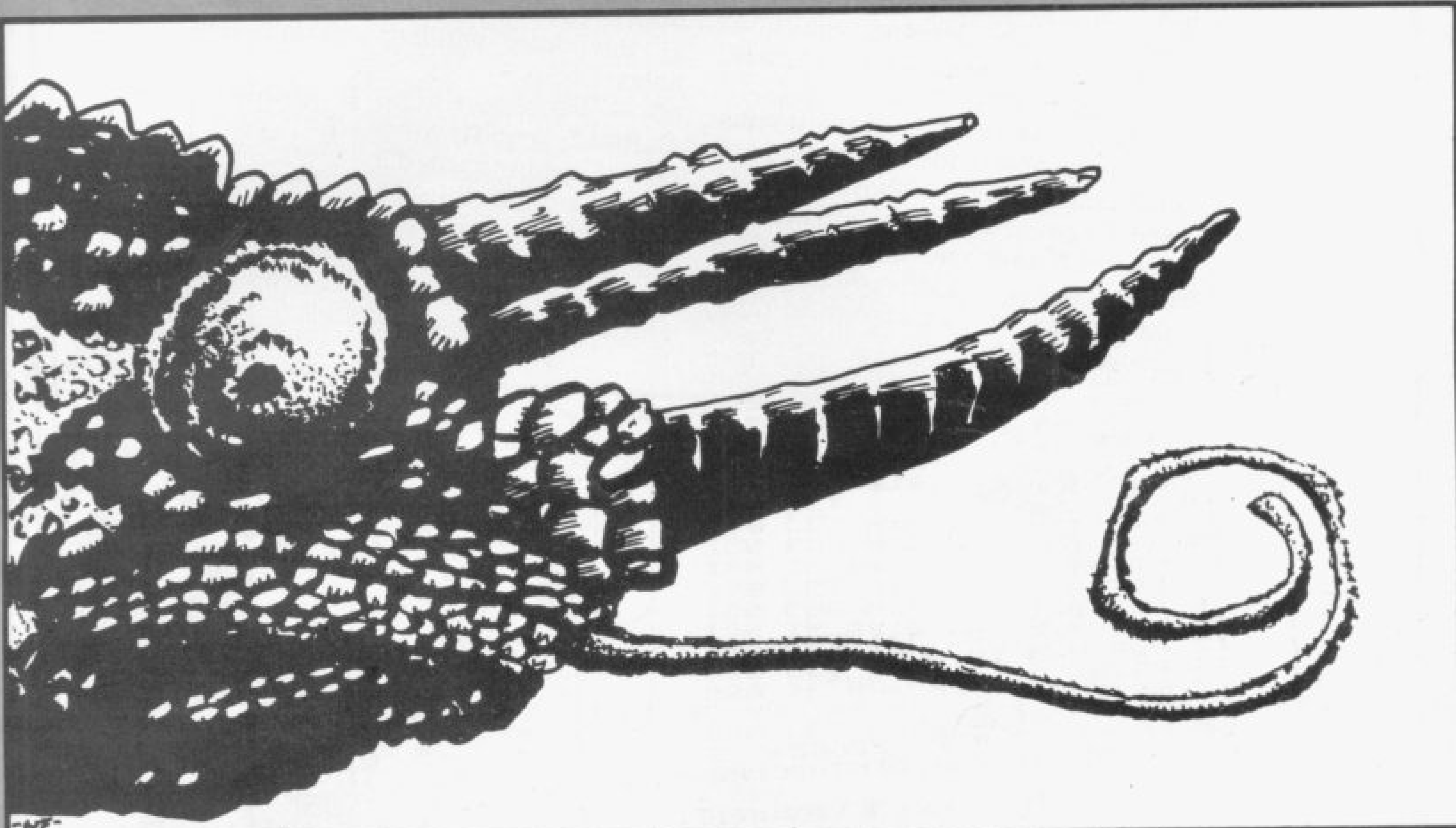
Finally, a health warning. Apart from any practical uses, computing with your ZX-81 can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning, thinking that in another five minutes you will sort out the problem.

Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a ZX-81 you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours with your Sinclair machine.

PROGRAM PRINTOUT



FLYCATCHER

IF YOU like creepy-crawlies you will like **Flycatcher.** A bug-eating reptile squats at the top of the screen, hungry for the flies which buzz past below it. Pressing P causes its long, dripping tongue to slide out and if a fly is caught on its tip, the tongue is retracted and the player scores 10 points.

There are two snags. One is that the flies reduce speed when they see the tongue moving in their direction. The other is that the tongue cannot be retracted until it bags the bluebottle; missing causes it to hang helplessly until another victim strays into its clutches.

You lose one point for every fly which starts and the game ends when the tongue touches line 16 without catching anything.

Graphics notes:
60 — Graphic W, graphic 6, graphic 5.
70 — Graphic Q, graphic R, graphic 4.
130 — Space, shifted N, shifted M.
190 — Graphic 5.

```
 10 LET S=0
 20 GOTO 50
 30 CLS
 40 LET S=S+10
 50 LET A=2
 60 PRINT AT 0,10;"▛█▜"
 70 PRINT AT 1,10;"▟█▙"
 80 LET C=INT (RND*15)
 90 IF C<3 THEN GOTO 80
100 PRINT AT 0,18;S
110 LET S=S-1
120 LET D=0
130 PRINT AT C,D;" ><"
140 LET D=D+1
150 IF D=18 THEN GOTO 80
160 IF INKEY$="P" THEN GOTO 180
170 GOTO 130
180 LET T=2
190 PRINT AT A,11;"▌"
200 LET T=T-1
210 LET A=A+1
220 IF T=0 THEN GOTO 130
230 IF C<>A THEN GOTO 250
240 IF D>8 AND D<14 THEN GOTO 3
0
250 IF A>16 THEN STOP
260 GOTO 190
```

WINDOW CLEANER

CLIMB the ladder to success in our **Window Cleaner** game from Niel Fleming Smith of Brampton Bierlow, South Yorkshire. Niel explains the idea:

"It involves manoeuvring a rung to the top of a ladder in the hope of reaching a window above. Keys M and N are used for right and left and the full stop moves it up. Hitting a part of the ladder kills you and after three lives, or running out of time, the game ends.

Once the window is reached, a new ladder is started with less time than at first. An extra 'man' is given at the third window." Graphics notes:

40 — Graphic shifted E, graphic shifted 7, graphic shifted R.
60 — Graphic shifted 5.
70 — Graphic shifted 5.
80 — Graphic shifted 5, space; two spaces; graphic shifted 5.
90 — Graphic shifted W; 12 graphic shifted 6s; graphic shifted 5.

```
  1 REM "WINDOW CLEANER"
  2 LET HS=0
  5 LET V=3
  6 LET S=0
  7 LET X=500
 10 LET W=0
 15 LET C=21
 20 LET D=15
 25 LET T=X
 30 LET A=5
 35 LET B=5
 40 PRINT AT 21,14;"▛▀▜"
 45 FOR N=0 TO V
 46 PRINT AT 21,N;"X"
 47 NEXT N
 48 PRINT AT 21,V;" "
 50 PRINT AT 0,0;"SCORE=";S
 60 PRINT AT 0,9;"▌HI-SCORE=";H
S;
 70 PRINT AT 0,22;"▌TIME=";T;"
 "
 80 PRINT AT 1,9;"▌ WINDOWS=";W
;"  ▌"
 90 PRINT AT 2,9;"▙▄▄▄▄▄▄▄▄▄▄▄▄
▌"
100 PRINT AT A,B-1;"   "
110 IF INKEY$="." AND A>3 THEN
LET A=A-2
120 LET B=B+(INKEY$="M" AND B<2
8)-(INKEY$="N" AND B>2)
130 IF A<20 THEN LET A=A+1
140 LET B=B+(RND>.5 AND B<28)-(
RND<.6 AND B>2)
150 IF A>=C AND B=D-1 OR A>=C A
ND B=D+1 OR T=0 THEN GOTO 300
160 PRINT AT A,B-1;"▛▀▜"
170 LET T=T-1
180 PRINT AT 0,28;T
190 IF A=C-1 AND B=D THEN GOTO
200
195 GOTO 100
200 LET S=S+1
210 LET C=C-1
220 IF C>4 THEN GOTO 30
230 CLS
240 LET C=21
250 LET W=W+1
260 LET X=X-25
270 IF W=3 THEN LET V=V+1
280 GOTO 25
300 LET V=V-1
310 IF V>0 THEN GOTO 25
320 LET S=S+(W*2)
330 IF HS<S THEN LET HS=S
340 INPUT A$
350 IF A$="N" THEN STOP
360 CLS
370 GOTO 5
```



ODDS & EVENS

A READER from Sleaford, Lincolnshire writes: "I am always frustrated to find that programs in magazines are generally emulations of arcade space games. I am sure there must be many readers who enjoy tackling a mind-bender."

Further to his policy, B McIntosh has sent a puzzle which depends more on tactical thinking than on quick work with the cursor finger.

You are given a column of numbers from 1 to 9 and are required to separate the odd and even numbers and place them in order of value on a second and third column.

You have two other columns to give you room to manoeuvre; moves are input by typing the column on which your number appears, then the destination column and then hitting the NewLine key.

The computer will count the number of moves taken and inform you of your score at the end of the game. The snags are that a greater number may not be placed on a smaller one; an even number may not be placed on an odd one and vice versa; once a number has left the first column, it may not return.

10 — All entries are separated by two spaces.
60 — Five graphic As, inverse space, two graphic spaces, inverse space, eight graphic As.
105 — Eleven spaces.
400 — See 10.

```
  1 LET A=0
  5 CLS
 10 LET A$="1  .  .  .  .  2  .
 .  .  .  3  .  .  .  .  4  .
 .  .  .  5  .  .  .  .  6  .  .
 .  .  7  .  .  .  .  8  .  .  .
 .  9  .  .  .  .  ."
 15 PRINT
 20 FOR N=1 TO 8
 30 LET S=N*15-14
 40 PRINT TAB 5;A$(S TO S+12)
 50 NEXT N
 60 PRINT TAB 6;"▒▒▒▒▒█▒▒█▒▒▒▒▒▒▒▒
"
 70 GOSUB 400
100 INPUT M$
102 IF M$="A" THEN RUN
105 PRINT AT 12,5;"
"
110 IF LEN M$<>2 THEN GOTO 100
115 LET A=A+1
120 IF M$(2)="1" THEN GOTO 310
130 LET G=VAL M$(1)*3-2
140 LET H=VAL M$(2)*3-2
150 FOR N=G TO G+105 STEP 15
160 IF A$(N)="." THEN NEXT N
170 LET G=N
180 FOR N=H TO H+105 STEP 15
190 IF A$(N)="." THEN NEXT N
200 LET H=N
210 LET H=H-15
220 IF VAL A$(G)>VAL A$(H+15) A
ND VAL A$(H+15)<>0 THEN GOTO 300
230 LET K=VAL A$(H+15)-VAL A$(G
)
250 IF K/2-INT (K/2)<>0 THEN GOT
O 300
255 LET A$(H)=A$(G)
260 LET A$(G)="."
270 PRINT AT 0,0
280 GOTO 20
300 IF VAL A$(H+15)=0 THEN GOTO
255
310 PRINT AT 12,5;"ILLEGAL MOVE
"
320 GOTO 100
400 IF A$(61 TO 120)=".  1  2  .
 .  .  3  4  .  .  .  5  6  .
 .  .  7  8  .  .  ." THEN GOTO 4
20
410 RETURN
420 PRINT
430 PRINT TAB 6;"***WELL DONE**
*"
440 PRINT
450 PRINT TAB 4;"THAT TOOK YOU
";A;" MOVES"
460 INPUT Z$
470 RUN
```





HELICOPTER LANDING

PICTURE yourself in a returning Sea King heading for Hermes through a force 10 gale. If you cannot, aid your imagination with this **Helcopter Landing** game from A G Fosberry of Bognor Regis.

The program is for the unexpanded ZX-80 and involves selecting both gale strength and amount of fuel on board, then guiding your craft to a pad on the left of the screen. Graphic notes: 120—Graphic, graphic 6, Q.

```
 15 PRINT "HELICOPTER SIMULATIO
N"
 20 PRINT "ENTER FUEL ON BOARD
? GALLONS"
 30 INPUT F
 35 LET F=F+1
 40 PRINT "GALE FORCE ? 0,5,10"
 41 INPUT Z
 43 CLS
 50 LET P=0
 60 LET X=10
 62 FOR I=1 TO F
 65 IF Z=0 THEN LET HC=P
 66 IF Z=5 THEN LET HC=RND(3)-1
 67 IF Z=10 THEN LET HC=RND(6)-1
105 FOR H=1 TO P+HC
110 PRINT " ";
115 NEXT H
120 PRINT "▀▄0";
130 FOR J=0 TO X
140 PRINT
150 NEXT J
152 FOR S=1 TO 13
154 PRINT " ";
156 NEXT S
158 PRINT CHR$ (130);
160 FOR K=1 TO 4
170 PRINT CHR$ (131);
180 NEXT K
183 PRINT "▌"
184 PRINT
185 PRINT ABS (I-F);" ";GALS"
188 IF X=0 AND P>6 THEN GOTO 40
0
190 INPUT C$
200 IF C$="5" THEN STOP
205 IF C$="6" THEN LET X=X-1
210 IF C$="7" THEN LET X=X+1
211 IF C$="5" THEN LET P=P-1
212 IF C$="8" THEN LET P=P+1
215 CLS
220 FOR G=1 TO (10-X)
230 PRINT
240 NEXT G
250 NEXT I
300 CLS
318 PRINT " S   T"
320 PRINT "  P A"
322 PRINT "   L"
324 PRINT "  P A"
326 PRINT " S   T"
328 PRINT
330 PRINT "GO AGAIN?"
340 INPUT C$
345 CLS
348 IF C$="Y" THEN GOTO 19
350 STOP
360 PRINT "WELL DONE"
400 GOTO 330
410
```

AMMETER & VOLTMETER CONVERSION

AMMETER and Voltmeter Conversion isa program for the1K ZX-81 which calculates the value of a resistor required to convert any meter to a voltmeter or ammeter of known range.

The program will first ask if you require conversion to voltmeter or ammeter — you need type-in only V or A. It then asks for the resistance of the meter and the Full Scale Deflection current and then, depending on whether you entered V or A, will ask either for the maximum reading of the converted meter.

```
  10 PRINT "VOLTMETER OR AMMETER
? ";
  20 INPUT A$
  30 PRINT A$,"RESISTANCE OF MET
ER? ";
  40 INPUT R
  50 PRINT R,"FSD CURRENT? ";
  60 INPUT F
  70 IF A$(1)="V" THEN GOTO 300
  80 PRINT F,"REQUIRED FSD CURRE
NT? ";
  90 INPUT S
 100 PRINT S
 105 LET R=(R*F)/(S-F)
 110 LET B$="SHUNT"
 120 LET C$="ACROSS"
 130 PRINT ,,,,
 140 PRINT "CONNECT A ";B$
 150 PRINT "OF ";R;" OHMS"
 160 PRINT C$;" THE METER"
 170 PRINT ,,,,"PRESS ANY KEY"
 180 PAUSE 4E4
 190 CLS
 200 RUN
 300 PRINT F,"MAXIMUM READING? "
 310 INPUT M
 320 PRINT M
 330 LET R=(M-(R*F))/F
 340 LET B$="MULTIPLIER"
 350 LET C$="IN SERIES WITH"
 360 GOTO 130
```



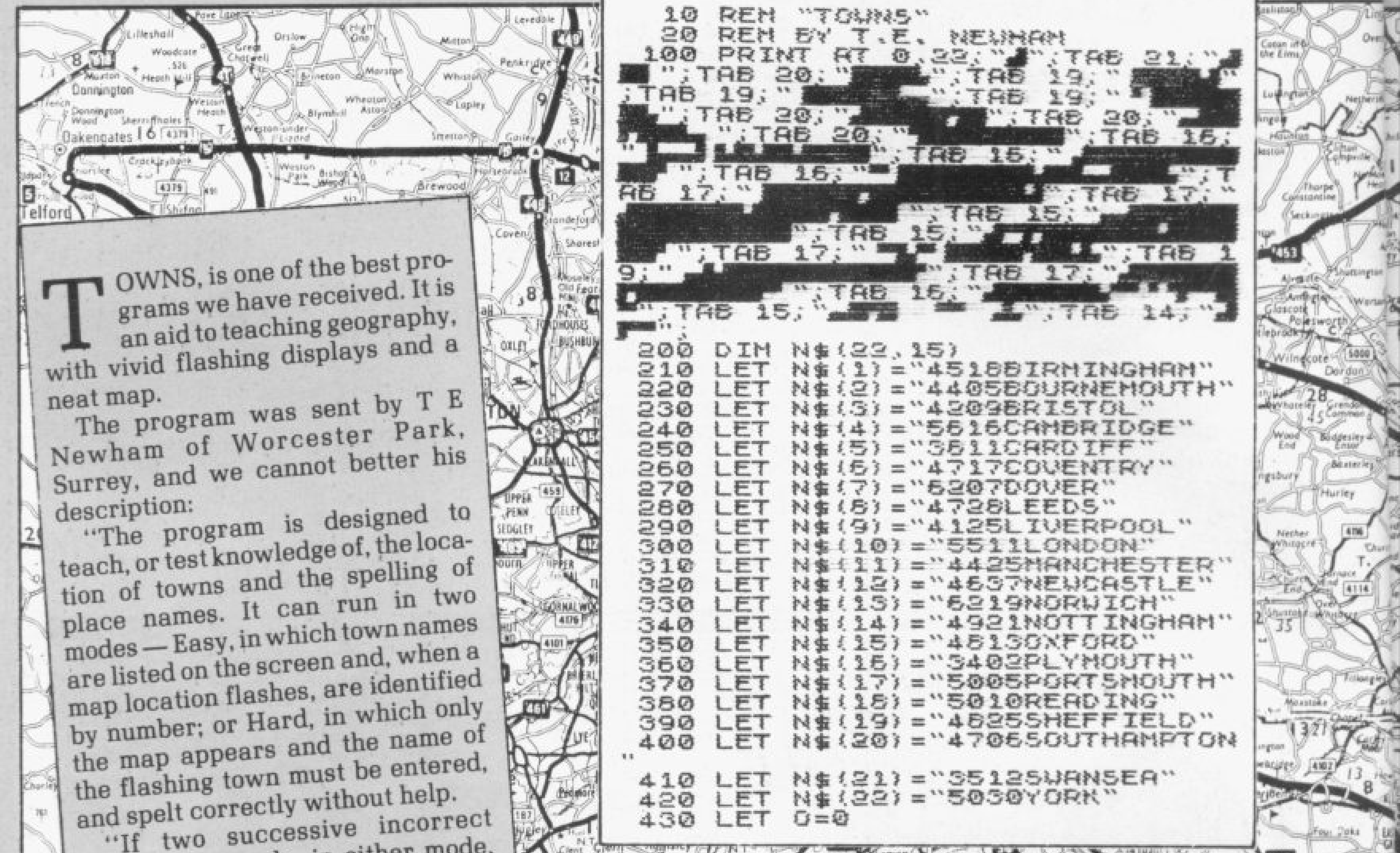
RIFLE RANGE

RIFLE RANGE is a straightforward but entertaining game, submitted by Eve Gorton of Stockport. It involves blasting at a moving row of ducks, fairground style.

You have 16 ducks to kill and an unlimited number of bullets. Once you have run out of ducks, you can press S for your score and sharpshooter rating.

"To date," she reports, "no-one has managed to shoot all 16 targets in only 16 shots." Graphics notes:
85 — Graphic shifted A.
90 — Alternate spaces and graphic shifted Ys, 16 of each.

```
  20 PRINT TAB 10;"RIFLE RANGE"
  25 PRINT AT 5,0;"YOU MUST HIT
ALL THE TARGETS TO LEARN YOUR SH
ARPSHOOTER RATING."
  30 PRINT AT 10,0;"PRESS THE F
KEY TO FIRE.  PRESS 0 TO START"
  35 IF INKEY$<>"0" THEN GOTO 35
  40 CLS
  75 LET S=0
  80 LET D=0
  85 PRINT AT 20,15;"▒ RIFLE"
  90 LET A$="▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ ▚ 
▚ ▚ ▚ ▚ ▚ ▚ "
  92 PRINT AT 8,15;"FIRE"
  95 PRINT AT 10,0;A$
 100 IF INKEY$="F" THEN GOSUB 12
0
 105 LET A$=A$(2 TO )+A$(1)
 106 IF A$="
                " THEN GOTO 200
 110 GOTO 95
 120 IF A$(16)<>" " THEN LET D=1
 125 IF D=1 THEN LET A$(16)="*"
 130 PRINT AT 10,0;A$
 135 IF D=1 THEN PRINT AT 8,15;"
GOOD SHOT"
 140 IF D=0 THEN PRINT AT 8,15;"
MISSED"
 145 FOR J=0 TO 10
 146 NEXT J
 150 IF D=1 THEN LET A$(16)=" "
 155 PRINT AT 10,0;A$
 160 IF INKEY$="F" THEN GOTO 160
 165 PRINT AT 8,15;"PRIMING     "
 170 FOR Y=1 TO 15
 175 NEXT Y
 180 PRINT AT 8,15;"FIRE        "
 185 LET D=0
 190 LET S=S+1
 195 RETURN
 200 CLS
 205 LET A$=" ALL GONE-PRESS S F
OR YOUR SCORE"
 210 PRINT AT 10,0;A$
 215 IF INKEY$<>"S" THEN GOTO 21
5
 220 CLS
 225 PRINT AT 10,0;"16 TARGETS H
IT WITH ";S;" SHOTS"
 230 IF S>=36 THEN LET R$="OH DE
AR. WHY NOT TRY AGAIN?"
 235 IF S>=21 AND S<=35 THEN LET
R$="*SECOND CLASS*"
 240 IF S<=20 THEN LET R$="***FI
RST CLASS***"
 250 PRINT AT 12,0;"SHARPSHOOTER
RATING:-";,R$
 260 STOP
```



TOWNS, is one of the best programs we have received. It is an aid to teaching geography, with vivid flashing displays and a neat map.

The program was sent by T E Newham of Worcester Park, Surrey, and we cannot better his description:

"The program is designed to teach, or test knowledge of, the location of towns and the spelling of place names. It can run in two modes — Easy, in which town names are listed on the screen and, when a map location flashes, are identified by number; or Hard, in which only the map appears and the name of the flashing town must be entered, and spelt correctly without help.

"If two successive incorrect guesses are made, in either mode, the computer gives the correct answer. There is a scoring system to record performance." Graphics notes — all entries are for graphic shifted keys, except spaces which are inverse:

100 — Q; Q, space, 5; three spaces, W; 8, three spaces, Q; 8, four W; 8, three spaces, Q; 8, four spaces, W, 6; 2, 8 five spaces, W; Q, four spaces, R, space; 6, two spaces, E, two spaces, W, 4; 2, 8, five spaces, W; Q, four spaces, R, space; 6, two spaces, E, two spaces, W, 4; R, seven spaces; 8, 6, 6, 5, W, space, Q, space, Q, three spaces; 3, ten spaces, 1; 7, 8, six spaces, W, two spaces, 6, Q, two spaces, W; 8, four spaces, E, eight spaces, Q; Q, five spaces, W, four spaces, R, to W spaces, 5; 6, Q, fourteen spaces; Q, 7, E, six spaces, Q, five spaces, 1; 2, R, E, 1, four spaces, R, space, W, W; 3, Q, Q, nine spaces, E; Q, five spaces, E, six spaces, E, 1; Q, five spaces, T, 7, 2, 2, E, 7, space, 7; 6, space, R, 5, space, 2, 7, space, 3, W; Q, E, 7.

920 — E, R, space, 5, T; 5, 8, two spaces; W, Q, space, 5, Y.

1020 — W, 8, space, E, R; E, Q, space, 5, 8; 5, R, space, W, Q.

1120 — J, M.

1230 — J, M.

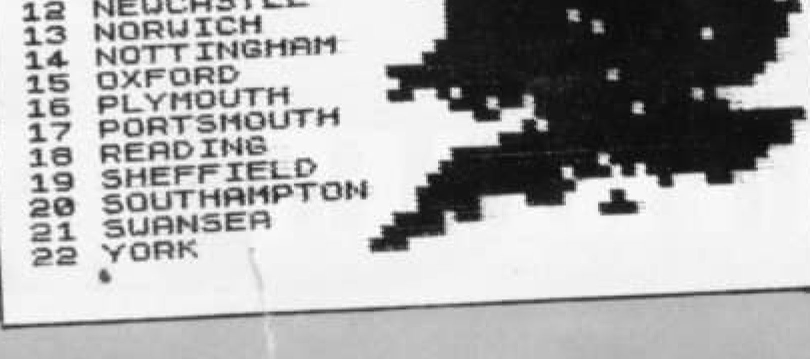
```
  10 REM "TOWNS"
  20 REM BY T.E. NEWHAM
 100 PRINT AT 0,22;"█";TAB 21;"
█";TAB 20;"█";TAB 19;"█"
;TAB 19;"█";TAB 19;"█"
█";TAB 20;"█";TAB 20;"
█";TAB 20;"█";TAB 16;
"█";TAB 15;"█"
█";TAB 16;"█";"T
AB 17;"█";TAB 17;"
█";TAB 15;"█"
█";TAB 15;"█"
█";TAB 17;"█";TAB 1
9;"█";TAB 17;"█"
█";TAB 16;"█"
";TAB 15;"█";TAB 14;"█
█";
 200 DIM N$(22,15)
 210 LET N$(1)="4518BIRMINGHAM"
 220 LET N$(2)="4405BOURNEMOUTH"
 230 LET N$(3)="4209BRISTOL"
 240 LET N$(4)="5616CAMBRIDGE"
 250 LET N$(5)="3611CARDIFF"
 260 LET N$(6)="4717COVENTRY"
 270 LET N$(7)="6207DOVER"
 280 LET N$(8)="4728LEEDS"
 290 LET N$(9)="4125LIVERPOOL"
 300 LET N$(10)="5511LONDON"
 310 LET N$(11)="4425MANCHESTER"
 320 LET N$(12)="4637NEWCASTLE"
 330 LET N$(13)="6219NORWICH"
 340 LET N$(14)="4921NOTTINGHAM"
 350 LET N$(15)="4813OXFORD"
 360 LET N$(16)="3402PLYMOUTH"
 370 LET N$(17)="5005PORTSMOUTH"
 380 LET N$(18)="5010READING"
 390 LET N$(19)="4825SHEFFIELD"
 400 LET N$(20)="4706SOUTHAMPTON
"
 410 LET N$(21)="3512SWANSEA"
 420 LET N$(22)="5030YORK"
 430 LET O=0
```

```
 440 LET W=0
 450 PRINT AT 5,14;"SCORE";TAB 1
4;"OK=";TAB 14;"NO=";
 460 GOTO 600
 500 LET C=0
 510 LET R=INT (RND*22)+1
 520 LET X=VAL N$(R, TO 2)
 530 LET Y=VAL N$(R,3 TO 4)
 540 UNPLOT X,Y
 550 IF INKEY$="" THEN GOTO 580
 560 IF INKEY$="O" THEN GOTO 750
 570 IF INKEY$="A" THEN GOTO 860
 580 PLOT X,Y
 590 GOTO 540
 600 PRINT AT 0,5;"EASY";AT 2,6;
"OR";AT 4,5;"HARD?";AT 6,5;"(E/H
)";
 610 PAUSE 4E4
 620 IF INKEY$="E" THEN GOTO 700
 630 IF INKEY$="H" THEN GOTO 800
 700 PRINT AT 0,5;"    ";AT 2,6;
"  ";AT 4,5;"     ";AT 6,5;"     
";
 710 FOR I=1 TO 22
 720 PRINT AT I-1,0;I;AT I-1,3;N
$(I,5 TO );
 730 NEXT I
 740 PRINT AT 0,24;"PRESS""O""";
TAB 26;"THEN";TAB 24;"INPUT NO";
TAB 24;"+NEWLINE";
 750 GOTO 500
 760 INPUT S
 765 LET T=INT (S/12)
 770 IF S=R THEN GOTO 900
 780 IF S<>R THEN GOTO 1000
 800 PRINT AT 0,3;"NAME THE";AT
4,4;"TOWN";AT 6,4;"  ";AT
10,0;"PRESS ""A"" TO";AT
WER, THEN";TAB 0;"SPELL THE NAME
";TAB 0;"AND ""NEWLINE""";
 810 FOR Y=1 TO 20
 820 PRINT AT 2,0;"
";
```

TOWNS

```
830 PRINT AT 2,0;"F L A S H I N
G";
840 NEXT Y
850 GOTO 500
860 INPUT S$
865 LET T=LEN S$
870 IF S$=N$(R,5 TO (LEN S$+4))
THEN GOTO 900
880 IF S$<>N$(R,5 TO (LEN S$+4)
) THEN GOTO 1000
900 FOR U=1 TO 3
910 PRINT AT 0,24;"        ";TA
B 24;"        ";TAB 24;"        ";TA
";TAB 24;"        ";TAB 26;"
920 PRINT AT 0,27;"▀▌█";TAB 2
7;"▙▛▘";TAB 2
930 NEXT U
940 LET O=O+1
950 PRINT AT 6,17;O;
960 GOTO 500
1000 FOR Z=1 TO 3
1010 PRINT AT 0,24;"        ";TA
B 24;"        ";TAB 24;"        ";TA
";TAB 24;"        ";TAB 26;"
1020 PRINT AT 0,27;"▛▌▌";TAB 2
7;"▗▚▟";TAB 2
1030 NEXT Z
1040 LET C=C+1
1050 IF C>=2 AND T<2 THEN GOTO 1
100
1055 IF C>=2 AND T>=2 THEN GOTO
1200
1060 PRINT AT 3,26;"TRY";TAB 27;
"AGAIN";
1070 LET W=W+1
1080 PRINT AT 7,17;W;
1090 GOTO 540
1100 PRINT AT 3,27;"SORRY";TAB 2
7;"     ";
```

```
1110 FOR V=1 TO 15
1120 PRINT AT R-1,0;"█";
1130 PRINT AT R-1,0;R;
1140 NEXT V
1150 LET W=W+1
1160 PRINT AT 7,17;W;
1170 GOTO 500
1200 PRINT AT 3,27;"SORRY";TAB 2
7;"     ";
1210 PRINT AT 19,2;N$(R,5 TO );
1220 FOR Z=1 TO 40
1230 PRINT AT 19,0;"█";
1240 PRINT AT 19,0;" ";
1250 NEXT Z
1260 PRINT AT 19,0;"
";
1270 GOTO 1150
```



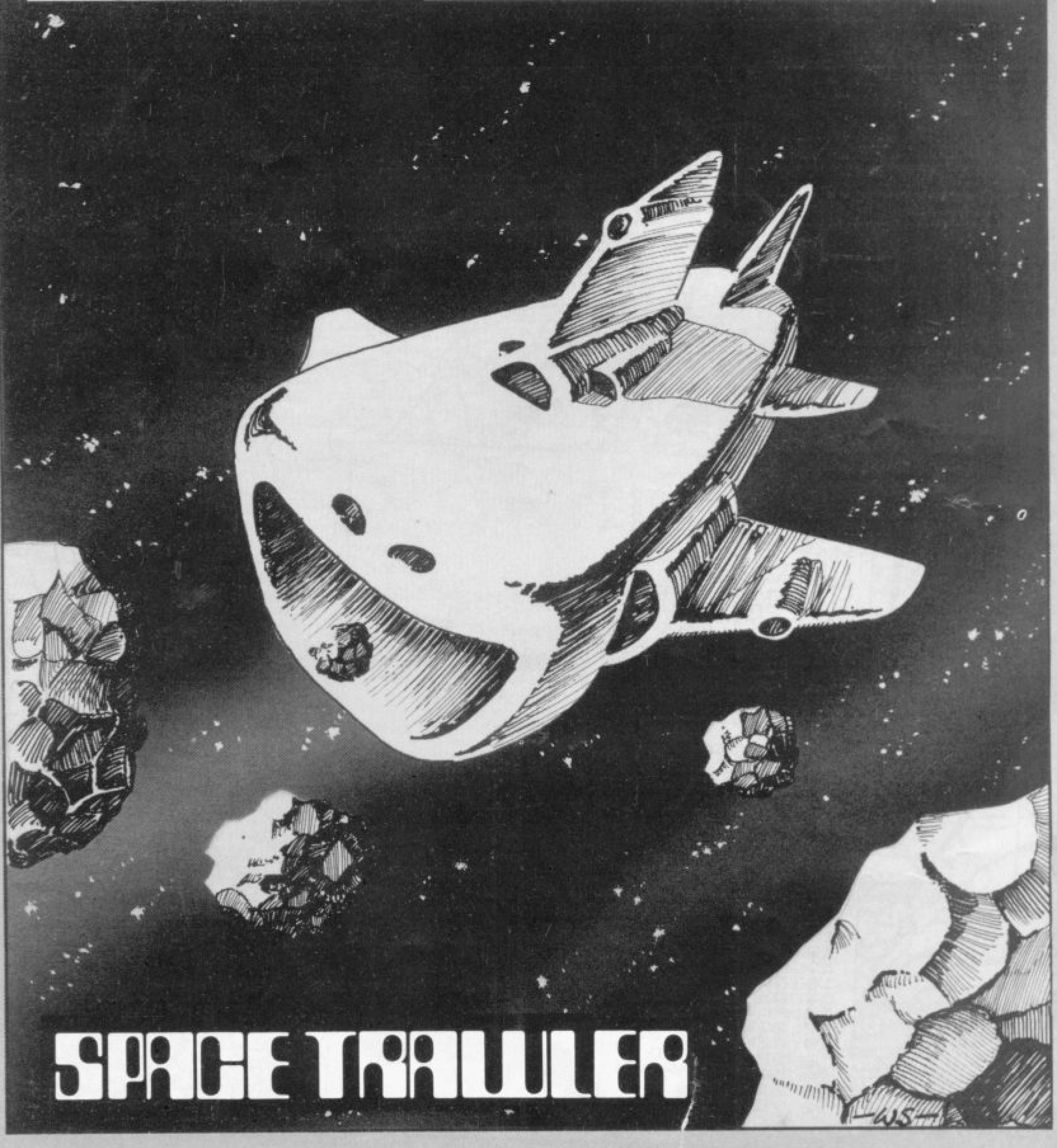
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```
   1 LET S=0
   3 LET H=15
  20 LET H=H+(INKEY$="8")-(INKEY$
="5")
  30 PRINT AT 3,H;
  40 LET P=PEEK (PEEK 16398+256*
PEEK 16399)
  50 LET S=S+(10 AND P=27)+(50 A
ND P=23)
  60 IF P=128 THEN GOTO 500
  90 PRINT ("V" AND INKEY$="")+(
"<" AND INKEY$="5")+(">" AND INK
EY$="8");AT 10,RND*31;CHR$ 27;AT
 10,RND*31;CHR$ 23 AND RND>.75;A
T 3,H;CHR$ 0;AT 10,RND*27;"█████
"
 120 SCROLL
 130 GOTO 10
 500 PRINT AT 3,H;"█";AT 15,14;S
```



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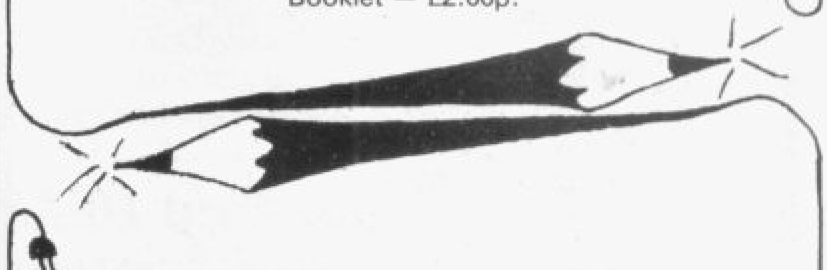
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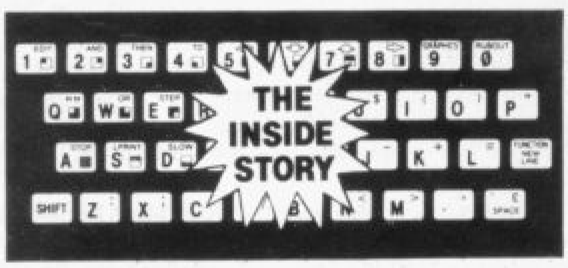
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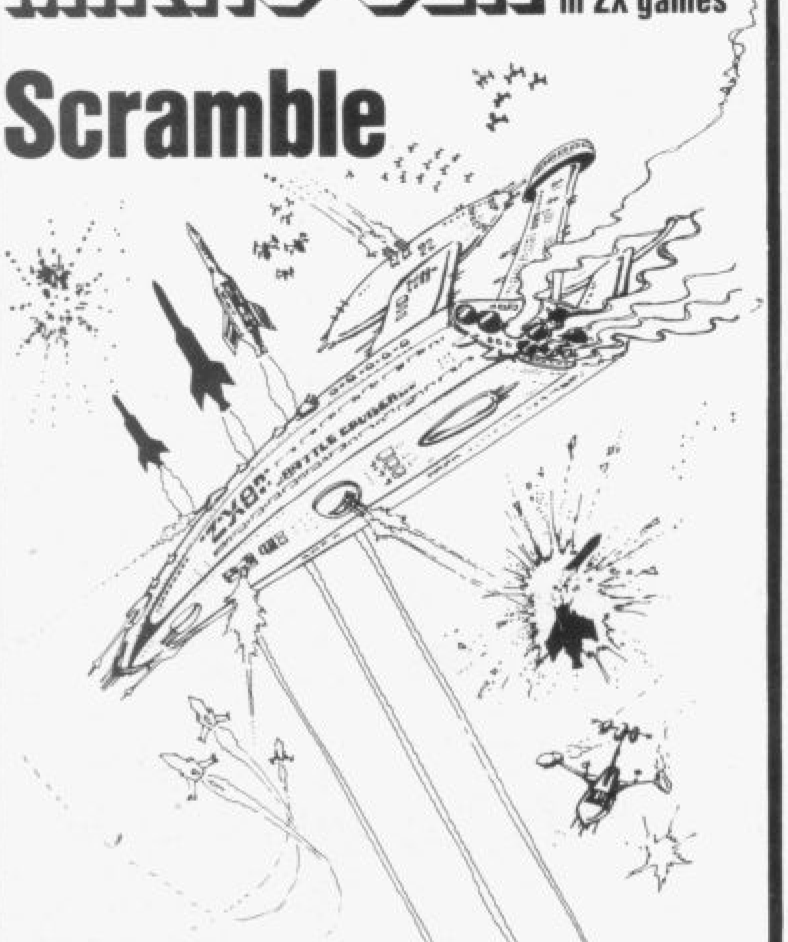
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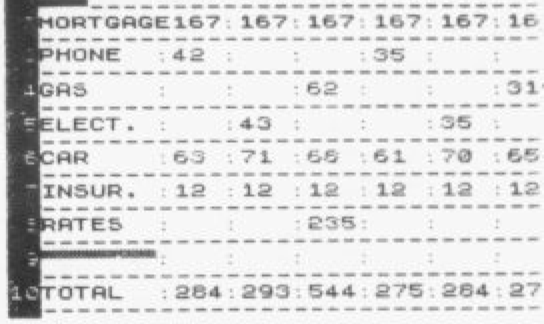
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U.S. firm makes a new printer

AN AMERICAN company, Mindware, has produced a blue-ink-on-plain-paper printer for the ZX-81. Having 16 characters per line, it cannot produce the full screen picture like the Sinclair printer but the user can set various modes to give the display he wants by POKEing a system variable 16417 with the mode required.

After that the printer will react like the Sinclair printer to COPY, LLIST and LPRINT. The port used is the same as the Sinclair printer and an EPROM in the printer controls its operation without taking-up any memory space.

Mode 1 is the screen split in half, the left-hand side being printed before the right-hand side; Mode 2 will be used for extra character sets in the printer; Mode 3 is for a 16-character line LIST and Mode 0 is used for LLIST.

The paper used is the same type as for till rolls and the ink cartridges are easily available. All graphics are printed. The printer costs £65. Mindware is at 70, Boston Post Road, Wayland, MA 01778 U.S.A.



Mindware printer.

ZXED is now on EPROM

ZXED d'Ktronics Basic editor is now available on EPROM for those with the graphics board from the same firm. Instead of a long wait for the cassette to load, it is available instantly by typing-in RAND USR 16025.

It will then provide facilities such as a full renumber of GOTOs, as well as GOSUBs and line numbers, Find, Insert, Delete, Move, Copy and Keep Basic lines within a program. Keep and Insert store program lines above RAMTOP to be Inserted into another program. Alter allows you to search the program for a string of characters and replace them. A help instruction is also included, giving instructions on using ZXED.

The 4K EPROM is in the RAM socket provided on the graphics board and does not affect the use of the other EPROM. The cost of the EPROM is £9.95 from d'Ktrontics, 23 Sussex Road, Gorleston, Great Yarmouth, Norfolk. A keyboard is also available for the Spectrum complete with numeric pad for £30, plus £15 for the case, but you have to add £1.50 for postage and packing.

ZX-81 tests the temperature

CHESHIRE Micro Design has produced a temperature sensor for the ZX-81. The device, called the ZR3, plugs into the EAR and power sockets of a ZX-81 and can measure temperatures from -5 to +100 degrees centigrade.

The measurement time is one second and a USR machine code routine is provided as a listing or on cassette. The unit is hermetically-sealed and the probe can be up to 35 metres long; two metres is provided.

The probe returns a number between 500 and 2000. Accuracy is claimed to be to one degree centigrade.

The ZR3 can be obtained from Cheshire Micro Design, 66, Close Lane, Alsager, Stoke-on-Trent ST7 2TR. Tel: 093-63-6196. It costs £17.50 including post and VAT for the U.K. Foreign orders should add postage for 240 grammes.

Ad-Lib plot for graphics

A GRAPHICS plotter sheet for the ZX-81 is available from Ad-Lib for formatting your screen display. It consists of a plastic-coated paper sheet 8 by 11½in., with the screen PRINT squares on one side and the PLOT squares on the other.

On the PRINT side there is also a list of the graphics symbols. The sheets are supplied with an overhead projection pen which must be used. They can be re-used by erasing the drawing with a damp cloth.

The cost of five sheets and one pen is £2.50 and a pack of coloured pens for formatting on the Spectrum is available at £4.75 from Ad-Lib, 2A Grovelands Avenue, Hitchin, Herts. Tel: 0462-56074.

Twin EPROM from Taurus

TAURUS Computer Design has produced two EPROMs on a board for fitting inside the ZX-81. The first contains a monitor plus an added dis-

continued on page 38





continued from page 37

assembler in 4K. The second contains an assembler for rapid translation of machine code programs into bytes on which the Z-80A can run.

Together they make a very powerful machine code facility which is available at switch-on by using a USR routine. The board fits underneath the keyboard and resides in the memory from 8K-16K.

There is also a word processing EPROM (4K) which will provide up to five character sets, including lower-case characters. The monitor, disassembler, assembler and character set are also available on cassette.

The board and monitor disassembler costs £30, the character set EPROM £10, and the assembler EPROM £12. Cassette versions — monitor £8.75, disassembler £6.50, character set £6.50, assembler £6.50; a user manual is provided with each. Taurus is at 47 High Street, Baldock, Herts SG7 6BG. Tel: 0492-893900.

Gordon keyboard

GORDON Electronics has produced a keyboard in a case which requires no soldering to attach it to the ZX-81. The pins provided on the end of the ribbon cable push into the keyboard sockets on the ZX-81 printed circuit board.

The cost of the keyboard is £25.50 and in its case it is £37.50, including VAT and postage.

Gordon Electronics, 76 Mountbatten Road, Braintree, Essex CM7 6TP. Tel: 0376-26048.

Memotech expansion

MEMOTECH has added three new black boxes to its range. A hi-res board — 192 x 256 pixels — can have its memory page anywhere in RAM and it can also have more than one of the 6.5K pages stored in memory for rapid graphics. The hi-res can be used with any of the company's RAM packs, including the new 32K.

The 32K RAM pack can have an existing 16K RAM pack — not only from Memotech — added to give 48K of usable memory.

The black box is a Centronics-parallel port plus driving software to run a printer. The 32K RAM costs £49.95, Hi-res £61.80, Centronics port £41.90.

Memotech Ltd, 3 Collins Street, Oxford OX4 1XL. Tel: 0865-722102.

Mansfield printer paper

MANSFIELD Computers and Electronics now supplies printer paper at £10.95 for six rolls, as well as software and books for the ZX user. Mansfield Computers and Electronics is at 76 Ratcliffe Gate, Mansfield, Notts NG18 2JB. Tel: 0623-31202.

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Data handling can be achieved on ZX-81

I CANNOT claim that the column has a theme this month, as the letters in my postbag have been too varied; it must be something to do with the weather. John Perry of New Malden, Surrey, writes: **"I have been trying to convert a program written for the TRS-80 but the program uses DATA and READ statements which are not available on the ZX-81. I am considering jumping on the machine because if it cannot handle data it is useless."**

There is a solution to the problem but first let me explain that DATA and READ statements provide a method for declaring the value of variables at the time the program is written, to save the user from entering the items at run-time. For example, the lines:

```
10 DATA 1, 2, 3
20 READ A, B, C
```

will assign the values 1, 2 and 3 to A, B and C respectively every time the program is RUN. The same effect could, of course, be achieved by using

```
10 LET A = 1
15 LET B = 2
20 LET C = 3
```

The real power of DATA and READ statements is that they allow the programmer to change the values of variables during execution. For example:

```
10 DATA 1, 2, 3, 4, 5, 6
20 READ A, B, C
.
.
.
.
.
1000 READ A, B, C
```

will cause A, B, C to take the values 1, 2, 3 initially and then 4, 5, 6 at line 1000. Once again, the same effect could be achieved using LET statements and so the ZX-81 Basic programming manual is correct in pointing out on pages 145 and 146 that READ and DATA are more or less superfluous instructions.

To prevent Perry jumping on his ZX-81, here is a method of simulating READ and DATA:

```
10 PRINT "INITIALISE,
CALCULATE OR SAVE*(I,C,S)?"
20 INPUT Z$
30 GOTO 10 + 40*(Z$ = "I")
 + 190*(Z$ = "C") +
1990*(Z$ = "S")
50 PRINT "INITIALISE",,"ENTER
TEN SETS OF THREE
CONSTANTS"
60 DIM B(3,10)
70 FOR I = 1 TO 10
80 FOR J = 1 TO 3
90 INPUT B(J,I)
100 NEXT J
110 NEXT I
120 PRINT "INITIALISATION
COMPLETE"
130 GOTO 10
.
.
.
.
.
2000 PRINT "SAVE ROUTINE",,
"ENTER PROGRAM NAME"
2010 INPUT Z$
2020 SAVE Z$
2030 GO TO 10
```

For the purposes of the demonstration I have assumed that the important part of the program lies between lines 200 and 1999. The initialising routine at lines 50 to 130 asks the user to enter the values which simulate the DATA statement. Those values need only be entered once, because the save routine at line 2000 saves both the program and the variables on cassette and then jumps back to the beginning of the program.

Next time the program is loaded from cassette it will "come in running" and jump back to line 10 with the values of all the variables, in particular the values in array B, still intact. He is then free to transfer the values out of the array later in his program.

In fact, once the values of B are established, lines 50 to 130 are redundant and could be deleted by entering each line number in turn in the usual way — see my answer to Mike Chandler later for a more interesting method. It is important, however, not to start a program by using RUN if you want to retain the variables. You should use GOTO 1 or some other appropriate line number instead.

John Randall of Woking, Surrey, should note the use of GOTO instead of RUN. He writes: **"Can you suggest a programming technique so that initials and a score are**

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keyed-in and retained during saves to enable a best-score system to operate for games?"

I have been asked that kind of question a surprising number of times. The answer is that so long as you do not use RUN, NEW or CLEAR, all your variables are retained. They are also copied on to cassette during SAVE and copied back into memory during LOAD.

"Deleting lines by entering their line numbers in turn is a nuisance. Is there a method for deleting blocks of lines?" asks Mike Chandler of Glasgow.

There is, because the length in bytes of each line is held in two locations immediately following the line number and we can manipulate them to our advantage. To see the line length, clear your ZX-81 by entering NEW and then enter the following line:

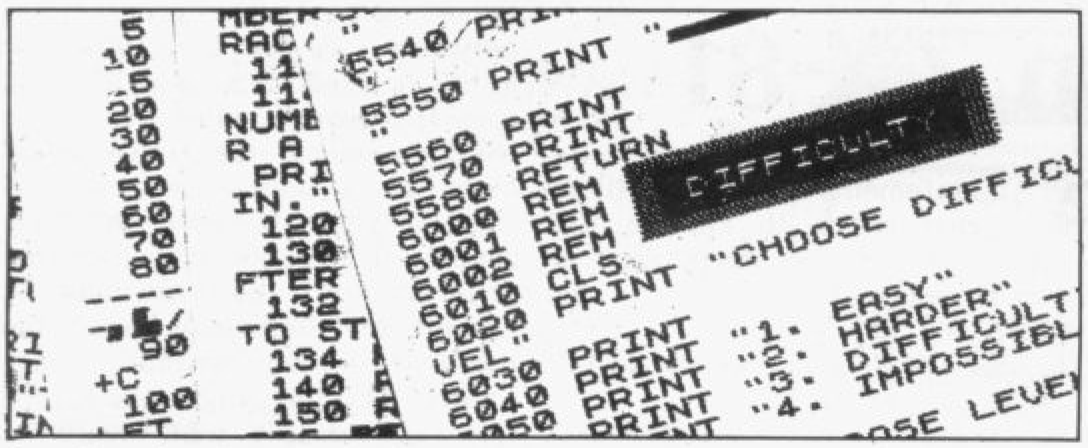
```
10 REM
```

Then PEEK at the first few bytes in the program area which starts at 16509 and you will see:

Address	Contents	Meaning
16509	0	line number =
16510	10	256*0 + 10 = 10
16511	2	line length =
16512	0	2 + 256*0 = 2
16513	234	code for REM
16514	118	code for newline

Notice that the line length excludes the four bytes required for the line number and the line length. The following routine finds the address of the first byte of two lines entered by the user:

```
9000 DIM B (2)
9101 LET START = 16509
9020 PRINT "ENTER FIRST AND
LAST LINE NOS"
9030 INPUT B (1)
9040 INPUT B (2)
9050 IF B (1) < 0 OR B (2) <
OR B (1) > 9999 OR
B (2) 9999 THEN GOTO 9020
9100 FOR I = 1 TO 2
9110 LET L = PEEK (START + 2)
 + 256*PEEK (START + 3)
9120 LET LINEND = 256*PEEK
START + PEEK (START + 1)
9130 LET START = START + L + 4
9140 IF LINEND < B (I) THEN GOTO
9110
9150 LET B (1) = START —
(L + 4)*(I = 1)
9160 NEXT I
```



The routine finishes with the two addresses held in B (1) and B (2). The next trick is to fool the ZX-81 into thinking that all the lines between and including the two line numbers are just one monster line by POKEing the difference between B (2) and B (1) less 4 into the slot for the line length of the first line. That is achieved by adding the lines:

```
9200 LET B(2) = B(2) — B(1) —4
9210 POKE B(1) + 2, B(2) —
256*INT (B(2)/256)
9220 POKE B(1) + 3, INT (B/2)/256)
```

The monster line can then be deleted in the usual way, by entering the line number alone.

Derek Chadwick of Kingston, Surrey, has an interesting question. He asks: **"Is there any way of lining-up figures by the right? I am calculating interest amounts to two decimal places".**

The following routine will round to two decimal places the data entered at line 20 and right-justify the figure printed at line 80. Notice that 0.5 is added in the calculation to round the number in line 30 because the INT function always rounds-down. If the 0.5 were not present, then 9.877, for example, would be rounded-down to 9.87 when it should be rounded-up to 9.88.

The print position is determined by converting the value of I to a string and then calculating where the decimal point occurs; it functions correctly even if I is an integer and hence has no decimal point.

```
10 LET D$ = "."
20 INPUT I
30 LET I = INT (100*I + 5)/100
40 LET ZS = STR$ I
60 IF ZS (J) = D$ THEN GOTO 80
70 NEXT J
80 PRINT AT 21, 16-J; Z$
90 SCROLL
100 GOTO 20
```

Janet Peterson of Grove asks: **"Is it possible for a cassette tape to wear out? I am a teacher and my class has used a commercial cassette of games many times but I am finding it increasingly difficult to load."**

Yes, magnetic tape will fail eventually. There are several problems. First, simply reading a cassette degrades the signal stored on it by a small amount so if you LOAD from it many times the signal will become weak. Second, if you leave a cassette untouched the signal from each layer of tape will print through on to the next, causing an eventual degradation of the tape. Finally, if you always stop the cassette at the same place and then re-wind it, the tape will stretch.

My advice is always to make a second copy of important cassettes. If you have a commercial cassette which you cannot copy because you cannot break the program while it is running, then "exercise" the cassette regularly by re-winding it completely. That will help to avoid print-through and stretch.

● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*



Pac-man hits the Sinclair scene



PAC-MAN, the colourful chomping video game from the U.S., has hit the Sinclair scene with a vengeance. Not content with having a book and even a hit record about it, no fewer than three companies have developed versions for the 16K ZX-81.

The DJL Software **Zuckman** is written in 10K of machine code and has all the addictive features of the original within the limitations posed by the ZX-81 character set. You are the gobble-man ("0") being chased by the ghosts — inverse commas — as you make your way round the 29x21 maze, eating the dots in your path.

One of the reasons for the enormous popularity of Pac-man is the way he hunter can be eaten by the game; if you eat one of the four corner "energy posts", the ghosts change their appearance and you can then chase them and win a bonus if you catch them.

You have to be careful, as, after a few seconds, they revert to their old nasty selves.

DJL made an unusual choice of keys for movement — Q and P for left and right, M and X for up and down — but the knack can soon be acquired. Zuckman costs £5.95 from DJL Software, 9 Tweed Close, Swindon, Wiltshire.

In the Babtech **Zedman,** you are a mouse in a 19x19 maze; the standard cursor controls are used for movement. The four ghosts move from the central area one after another and roam the maze in search of their prey. Eating the dollar signs in the corners makes the ghosts edible for a short time but Babtech warns that they are slippery creatures and may pass you if you rush at them.

You have three lives but if you find it all too easy you have 10 skill levels from which to choose to keep you on your toes.

The 4K machine code Zedman is complete with **Spacers,** an invaders-type program, giving two arcade games for £5.95. Babtech is at 3, Bakerton Mains View, Edinburgh, EH14 3BR.

The third Pac-man look-alike is the Abersoft **Mazeman,** which also uses the standard cursor controls, this time on a 30x20 maze. Once the mazeman starts moving he continues until he hits a wall or you change his direction. The ghosts have four possible shapes; A means it is its own normal unpleasant and dangerous self, moving randomly round the maze; B means you have eaten a corner "power capsule" and the ghosts are vulnerable; inverse B means they are about to turn nasty again.

Written in 5K of machine code, the game also provides an extra mazeman if you score 10,000 points. Mazeman costs £4.45 from Abersoft, 7 Maesafallen, Bow Street, Dyfed, SY24 5BA.

Playing at business

IF YOU FANCY yourself as a financial whizz-kid, test your skills with two new business games from CCS, **Airline** has good animated bar charts and histograms and is full of unexpected hazards.

We were hi-jacked by the PLO but managed to make a profit at the end of the first year. In the next year, however, we overspent on staff and faced the prospect of resigning. There are some pertinent decisions to be made and the game provides a useful introduction to the business world and its terminology. The aim of Airline is to take-over British Airways as soon as possible.



In **Autochef,** it is to buy Trusthouse Forte by the judicious management of a chain of restaurants and fast food outlets. There are three levels of difficulty, although even on the easy level we lost a fair amount of money, and it helps to have a pen and some paper to keep track of cost forecasts, rent, and other vital factors.

The games cost £4.75 each, and are available from CCS, 14 Langton Way, London SE3 7TL.

Pixel makes use of space

TWO INTERESTING new space games, both in 16K, are from Pixel Productions. In **Subspace Striker,** you are the captain of the Swordfish, which lurks in hyperspace shooting-down enemy vessels with its deadly Antimat torpedoes. A fairly familiar theme is enlivened by some splendid graphics of the various spaceships and excitement is added by the capacity of the Swordfish to surface and dive to avoid enemy fire.

An especially good destruction sequence compensates for the mis-

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fortune of suffering a direct hit. The instructions are a little confusing at first but stay with it. It costs £5.50 for the ZX-81 version.

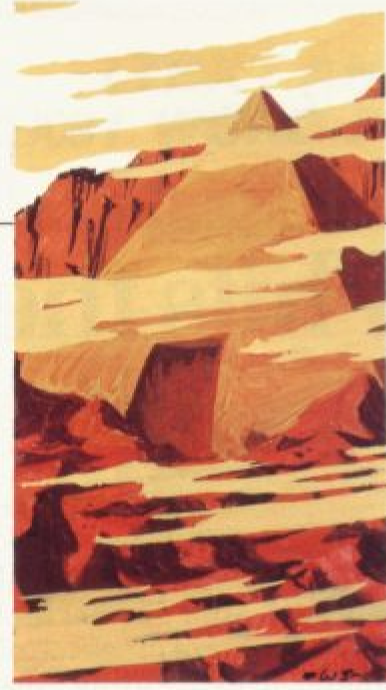
There are outstanding graphics in **Trader**, too, many of them animated, and the story line is original and entertaining. You are an inter-galactic trader trying to make a profit on your wares while escaping a variety of pitfalls on your journey from moon to moon.

You will need to do some quick thinking and it helps to have pen and paper handy to keep tabs on your stocks. We made a killing on Synthomunch, a yukky kind of staple food popular in the Meridien area, but cannot guarantee it will work for you.

The game is in three parts, so that it is in effect a 48K saga, with plenty to keep you absorbed to the end. The complete thing costs £10.50. Both games are available from Pixel Productions, 39 Ripley Gardens, London SW14 8HF.

Adventurous Synacroop

SYNACROOP Software has produced a cassette of four games, all in 16K. Two are short and simple. There is a two-player gambling game, **Up against the wall,** and a straightforward shoot-out with alien spacecraft called **Revenge of the flying saucers.**



Each side also features a more sophisticated adventure, one of which is called **Escape from the Pyramid of Mars.** There the aim is to collect four keys from the depths of the pyramid without being annihilated by a mysterious flashing defence mechanism. The graphics are lively and because the hazard is a random one, the suspense builds-up, especially when safety is in sight.

Escaping before the oxygen runs out is problematic but not impossible.

The other adventure is **Curse of the Aztec tomb,** based mainly on graphics, depicting fiendish dangers such as falling boulders and bridges which close as you are about to jump on to them. You will need nimble fingers on the control keys and perhaps a practice game or two to earn a high score. The cassette costs £4.95 and is available from Synacroop Software, 63 Cedar Avenue, Cosely, West Midlands.

Honorary club member served on *HMS Hermes* during the conflict in the South Atlantic.

ZX-81 sails to Falkland Islands

DURING the Falklands crisis we received many programs simulating some of the events in the South Atlantic. We have decided, however, to print only one special submission.

The listing overleaf was produced by a sailor on *HMS Hermes* while he was on active service with the Task Force.

In recognition of his part in the action we have decided to make Chief Petty Officer Trevor Walhen, 36, an honorary member of the Sinclair User Club. He received the news when he returned to Britain with *Hermes* towards the end of July. "It was marvellous," he said, "It made my homecoming even better."

He has had his ZX-81 since March and had a ZX-80 previously. Although he is an electronics engineer in the Royal Navy, in which he has served for 20 years, he did not start taking a deep interest in computers until he saw a colleague with a ZX-80.

"I read about them when they were first on sale but I was not really interested until I saw one and saw what it was capable of doing," Walhen says.

When the Task Force moved south, he took his ZX-81 with him to provide relaxation from the strain of the conflict — "I used to work during the night from 8pm to 8am and when I came off I would spend about two hours at a time with the ZX-81."

He adds that he had ordered a 16K RAM pack from Sinclair Research but as it had not arrived, he used to borrow one from a colleague, who also had his ZX-81 on board.

He sent his first program to *Sinclair User* in May but while he was in the South Atlantic he improved it twice before he submitted the final version, which is printed here and titled **HMS Hermes.** It takes 5K of memory.

"Because of its topicality, great interest was

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25pc off Kempston Spectrum add-on

STAR BARGAIN

CONTINUING the policy we began last month, we are again making two exclusive offers to members of the Sinclair User Club. This month it involves Carnell Sofware and Kempston Electronics.

To link with the start of our new *Spectrum User* section we are offering a discount of 10 percent off the add-ones developed by Kempston for the new machine. They include the 24-line user I/O port which allows you to have 24 individually-controlled lines. Normally it costs £16.50 but club members can obtain it for £14.90 including VAT.

Two items which have been produced for the time when the Microdrive is ready towards the end of the year are also being offered. A ZX motherboard which normally costs £16.95 is available for £15.25 and a ZX stackable connector, costing £5.50, will cost members £4.95.

Kempston's other major product, its 41-key click keyboard, is also available in this exclusive offer to members. The normal price is £26.50 but members can obtain it for £23.85.

The other part of our offer involves the range of software from Carnell Software. Members can save 25 percent of the normal price of the three cassettes sold by Carnell.

That reduces the cost of the **Volcanic Dungeon/ Hangman** from £4.50 to £3.40 and **Alien Intruder** and **Wumpus Adventure** from £5 to £3.75. All prices include VAT.

As usual, to permit members to take advantage of these offers, you can include an order with your membership application. A form is printed below.

MEMBERSHIP FORM

I wish to join the Sinclair User Club and enclose my subscription of £12

Name ....

Address ....

....

....

....

Which computer do you own?

ZX-81 ☐ Spectrum ☐

Send your coupons to Sinclair User Club, ECC Publications, 30-31 Islington Green, London N1 8BJ. Cheques should be made payable to Sinclair User Club.

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shown by other members of the crew and it helped ease the tension," he says.

Now he is home, Walhen is looking forward to a little relaxation and considering which computer to buy next.

In the game, an Argentinian Super Etendard aircraft is firing at Hermes, which is firing back. The aircraft is armed with Exocet missiles and bombs, which are released at random. Hermes has four Seacat missiles, which are also fired at random.

The carrier's other defence is its chaff device for decoying the Exocet. That is controlled by the player, who must press INKEY$ C as soon as it appears below the aircraft. The player also controls the movement of Hermes by the 5 and 8 keys.

To win, the player has to knock out 10 aircraft which can win by sinking the Hermes. That needs a score of 12, which can be achieved by receiving three for every Exocet hit and two for every bomb hit. Hermes is also being attacked by a submarine.



CPO Trevor Walhen as he crosses the equator on his way south.

Due to lack of space we have not been able to print our usual list of user groups. We apologise for this omission and will attempt to include it in October.

```
110 LET S=0
120 LET T=0
130 LET H=10
140 LET X=0
150 LET P=0
160 GOSUB 9000
170 GOSUB 2000
180 FOR E=0 TO 27
190 PRINT AT 0,E;"■";AT 1,E;"■■
■■"
210 LET A=INT (RND*21)+5
220 IF E>H-4 OR (A<>H AND A<>H+
1) THEN GOTO 300
230 FOR B=-12 TO -1
240 PRINT AT B,A;"*"
250 PRINT AT B,A;" "
260 LET A=A-.5
270 NEXT B
280 IF A=E-1 OR A=E OR A=E+1 OR
A=E+2 OR A=E+3 THEN GOTO 1000
300 LET F=INT (RND*18)+6
310 IF E<H+8 OR (F<>H+6 AND F<>
H+7) THEN GOTO 390
320 FOR G=-12 TO -1
330 PRINT AT G,F;"*"
340 PRINT AT G,F;" "
350 LET F=F+.5
360 NEXT G
370 IF F=E OR F=E+1 OR F=E+2 OR
F=E+3 OR F=E+4 THEN GOTO 1000
390 PRINT AT 11,H+4;"Y"
410 LET M=INT (RND*22)+2
420 IF M<>E+2 AND M<>E+3 THEN G
OTO 690
430 PRINT AT 2,M;"■"
440 PAUSE 30
450 LET C=-12
460 IF INKEY$<>"7" OR X=5 THEN
GOTO 530
470 FOR C=-12 TO -8
480 PRINT AT C,H+1;"+"
490 PRINT AT C,H+1;" "
500 NEXT C
510 PRINT AT C,H-2;"*******"
520 LET X=X+1
525 GOSUB 9000
530 FOR N=2 TO 13
540 PRINT AT N,M;"■"
550 PRINT AT N,M;" "
560 LET M=M+.5
570 IF C<>-7 THEN GOTO 590
580 IF N=7 AND (M=H-2 OR M=H-1
OR M=H OR M=H+1 OR M=H+2 OR M=H+
3 OR M=H+4) THEN GOTO 1100
590 NEXT N
600 PRINT AT 7,H-2;"       "
610 IF M=H OR M=H+1 OR M=H+2 OR
M=H+3 OR M=H+4 OR M=H+5 OR M=H+
6 OR M=H+7 THEN GOTO 1200
690 PRINT AT 11,H+4;"T"
710 LET J=INT (RND*24)+3
720 IF J<>E+1 AND J<>E+2 AND J<
>E+3 THEN GOTO 830
730 FOR K=3 TO 13 STEP 2
740 PRINT AT K,J;"■"
750 IF INKEY$="" THEN GOTO 800
760 LET H=H+(INKEY$="8")-(INKEY
$="5")
770 GOSUB 3000
780 LET H=H+(H<0)-(H>23)
790 GOSUB 2000
800 PRINT AT K,J;" "
810 NEXT K
820 IF J=H OR J=H+1 OR J=H+2 OR
J=H+3 OR J=H+4 OR J=H+5 OR J=H+
6 OR J=H+7 THEN GOTO 1300
830 IF INKEY$="" THEN GOTO 900
840 LET H=H+(INKEY$="8")-(INKEY
$="5")
850 GOSUB 3000
860 LET H=H+(H<0)-(H>23)
870 GOSUB 2000
910 LET W=INT (RND*15)+6
920 IF W=P+5 THEN GOSUB 6000
930 LET P=P+1
940 IF P=25 THEN LET P=0
950 PRINT AT 0,E;"  ";AT 1,E;"
"
960 NEXT E
970 GOSUB 9000
980 IF S<10 THEN GOTO 150
990 IF S=10 THEN GOTO 1500
1010 PRINT AT 0,E;"+   +"
1020 PRINT AT 1,E;" ZAP "
1030 PRINT AT 2,E;"+   +"
1040 PAUSE 30
1050 PRINT AT 0,E;"     "
1060 PRINT AT 1,E;"     "
1070 PRINT AT 2,E;"     "
1080 LET S=S+1
1090 GOTO 970
1110 PRINT AT 7,H-2;"DECOYED"
1120 PAUSE 30
1130 PRINT AT 7,H-2;"       "
1140 GOTO 700
1210 PRINT AT 13,H-1;"HIT"
1220 PAUSE 30
1230 PRINT AT 13,H-1;"   "
1240 GOSUB 2000
1250 LET T=T+3
1260 GOSUB 9000
1270 IF T>=12 THEN GOTO 1400
1280 GOTO 700
1310 PRINT AT 13,J-1;"HIT"
1320 PAUSE 30
1330 PRINT AT 13,J-1;"   "
1340 GOSUB 2000
1350 LET T=T+2
1360 GOSUB 9000
1370 IF T>=12 THEN GOTO 1400
1380 GOTO 900
1410 PRINT AT 11,H;"**      **"
1420 PRINT AT 12,H;"  SUNK  "
1430 PRINT AT 13,H;"**      **"
1440 PAUSE 300
1450 CLS
1460 PRINT AT 4,10;"THAT WAS"
1470 PRINT AT 6,6;" A DUMMY RUN"
1480 PRINT AT 10,6;"PLAY AGAIN D
UMMY"
1490 PRINT AT 12,3;"BUT THIS TIM
E ENGAGE BRAIN"
1495 STOP
1510 CLS
1520 PRINT AT 4,7;"BRITISH VICTO
RY"
1530 PRINT AT 5,7;"-------------
--"
1540 PRINT AT 10,10;"WELL DONE"
1550 PRINT AT 12,6;"YOU HAVE SHO
T DOWN"
1560 PRINT AT 14,6;"10 SUPER ETE
NDARDS"
1570 PAUSE 400
1580 CLS
1600 PRINT AT 4,10;"PLAY AGAIN"
1610 PRINT AT 5,10;"----------"
1620 PRINT AT 8,7;"TRY AND SHOOT
 10"
1630 PRINT AT 10,10;"MORE DOWN"
1640 STOP
2000 PRINT AT 11,H+4;"T";AT 12,H
+3;"■■";AT 13,H;"■■■■■■■■"
2010 RETURN
3000 PRINT AT 11,H+3;"  ";AT 12
,H+2;"    ";AT 13,H-1;"
"
3010 RETURN
6010 CLS
6020 GOSUB 7000
6030 GOSUB 9000
6040 PRINT AT 13,P+3;"■";AT 14,P
;"■■■■■■"
6050 FOR R=-10 TO -2 STEP 2
6060 PRINT AT R,W;"■"
6070 IF INKEY$="" THEN GOTO 6120
6080 LET H=H+(INKEY$="8")-(INKEY
$="5")
6090 PRINT AT 0,H+3;"  ";AT 1,H
+2;"    ";AT 2,H-1;"
6100 LET H=H+(H<0)-(H>23)
6110 GOSUB 7000
6120 PRINT AT R,W;" "
6130 NEXT R
6140 IF W=H OR W=H+1 OR W=H+2 OR
 W=H+3 OR W=H+4 OR W=H+5 OR W=H+
6 OR W=H+7 THEN GOTO 6200
6150 CLS
6160 GOSUB 2000
6170 GOSUB 9000
6180 RETURN
6200 PRINT AT 2,W-1;"HIT"
6210 PAUSE 30
6220 LET T=T+2
6230 IF T>=12 THEN GOTO 1400
6240 GOTO 6150
7000 PRINT AT 0,H+4;"T";AT 1,H+3
;"■■";AT 2,H;"■■■■■■■■"
7010 RETURN
9000 PRINT AT 17,9;"HMS HERMES";
AT 18,9;"----------";AT 21,0;"BR
ITAIN= ";S;AT 21,17;"ARGENTINA=
";T;AT 9,0;X
9010 RETURN
```



Win a ZX-99 by filling the screen

Our competitions have proved so popular that we are to continue them, despite having awarded the last of our printers in last month's contest, the winner of which will be announced next month.

We have decided to continue our policy of offering major prizes and this month we will be giving the winner a ZX-99 tape control system for the ZX-81.

This month our competition is based on an idea from a reader, Tony Poulter, of Meopham, Kent. The aim is to write a program for the 1K ZX-81 which will display a full screen of 748 characters. As that is regarded as impossible, it may be necessary to award the prize to the person who manages to achieve the greatest number of characters. We shall be looking also for the most elegant and flexible solution.

As a tie-break, should one be necessary, we want you to write a slogan beginning with the words: "I would like a Spectrum because. . ."

Entries should reach us by September 13.

The usual rules about the editor's decision being final and employees of ECC Publications being ineligible apply.

ENTRY FORM

Complete this slogan, which will be used as a tie-break: I would like a Spectrum because . . . .

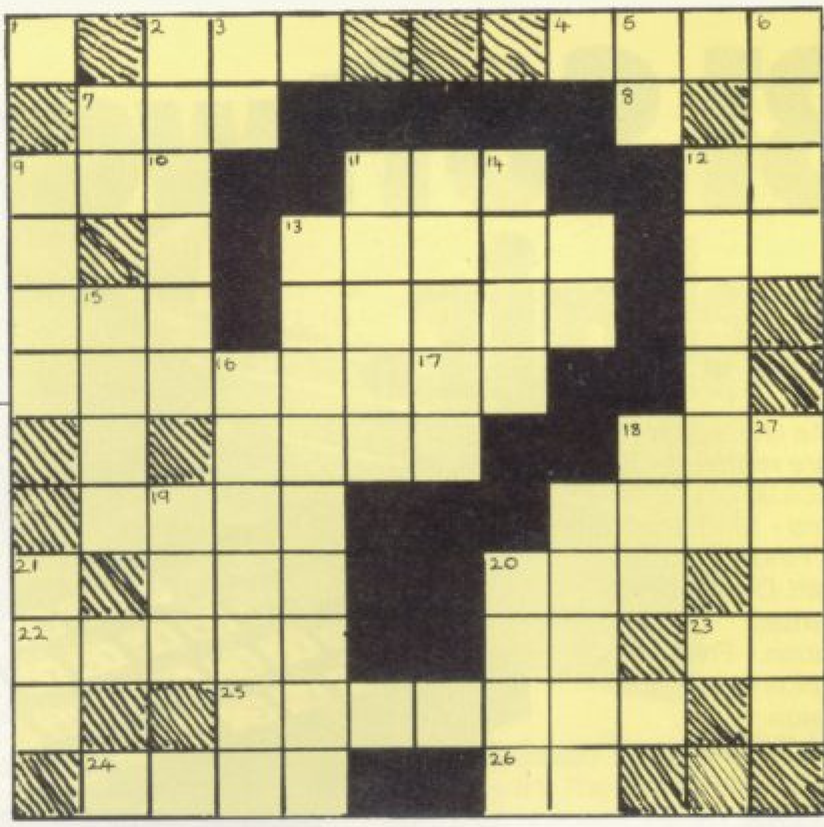
. . . .

Name . . . .

Address . . . .

. . . .

Send your entries to ECC Publications, 30-31 Islington Green, London N1 8BJ to arrive not later than September 13.



Philip Joy considers a pair of old mind games, anagram and crossword, and finds them difficult for computers.

Good use of screen by rare word games

I HAVE decided to include details about two things, a review of two programs, which are old mind games, **Anagram** and **Crossword.** The second thing is adventure games, on which I have received some very interesting comments.

First, Anagram and Crossword, both on one cassette and sent for review. It is obtainable from Warren Newman, 3 Thalia Close, Greenwich, SE10 9NA. The tape arrived with a brief description about both games.

Crossword was difficult to load, with the volume level critical, but that is common and is something ZX-81 owners expect. Newman's letter says: "It is, so far as I am aware, the first electronic version of a crossword puzzle".

I am not sure about it being the first but they are not very common. One reason is that they can be done only once; apart from changing the clues and answers, nothing else can be done when you finish it. You need someone else to make up and type the crossword, otherwise you will know the answers. For the same reason you must not list the program or the answers will be shown and the puzzle ruined.

It has a fast response time, using the fast mode of the ZX-81, and uses the screen well. One point is that there is an option to display the crossword. If you did that, surely the whole puzzle would be ruined? The clues are related to ZX-81 computer terms and so will appeal to enthusiasts.

On the B side of the tape, Newman says that a standard game of Anagram is offered with three levels of play. Again, though, the game was difficult to load, but once in you can make a back-up for your day-to-day use. One thing about this type of game is that it becomes uninteresting after playing many games. Again, as in Crossword, the screen is well-used; not all games make good use of the screen but these two certainly do.

> 'Crosswords can be done only once; apart from changing the clues and answers, nothing else can be done.'

My thanks to Newman for supplying the cassette for review. The cost is £4.95 and you will need 16K. I think it is reasonable value for money and if you like that kind of puzzle, you will like these programs. My thanks also to Leo Amatino, who looked at these games and gave unbiased remarks.

I would like to mention another game I received on tape, an "unbeatable" version of multiple-pile **Nim.** I say unbeatable in quotes, because no-one I have asked to play it has beaten it, including me. It has won some games and drawn some, but has not been beaten — a remarkable achievement.

With some of the rubbish programs on the market for the ZX-81, this program, I think, should be sold, but the sender has no plans to do so, so far as I know.

My favourite type of mind game is the adventure type, a game which is a total mind game like chess, but with more fun and general appeal. Adventures are the type of game in which you are projected into some castle/forest and you have to solve some problem, like finding the long-lost treasure.

Along the way there are numerous problems and each has an exceptional solution. Most microcomputer adventures have completion times of around a month.

The idea is derived from the large mainframe computers, where large disc packs are used to store the game and your progress. It is a fact that some computer centres stopped work while the workers tried to finish a problem.

Of course, the ones on microcomputers like the ZX-81 are not so complicated, but just as much fun to play, and there are many for the 16K ZX-81. They often produce much frustration but there is great satisfaction when a month of work produces a result.

Please send details of Mind Games to Philip Joy, 130 Rush Green Road, Romford, Essex, RM7 0QA.

New ZX81 Software from Sinclair.



A whole new range of software for the Sinclair ZX81 Personal Computer is now available – direct from Sinclair. Produced by ICL and Psion, these really excellent cassettes cover games, education, and business/household management.

Some of the more elaborate programs can only be run on a ZX81 augmented by the ZX 16K RAM pack. (The description of each cassette makes it clear what hardware is required.) The RAM pack provides 16-times more memory in one complete module, and simply plugs into the rear of a ZX81. And the price has just been dramatically reduced to only £29.95.

The Sinclair ZX Printer offer full alphanumerics and highly-sophisticated graphics. A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. So now you can print out your results for a permanent record. The ZX Printer plugs into the rear of your ZX81, and you can connect a RAM pack as well.

Games

Cassette G1: Super Programs 1 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Invasion from Jupiter. Skittles. Magic Square. Doodle. Kim. Liquid Capacity.
Description – Five games programs plus easy conversion between pints/gallons and litres.

Cassette G2: Super Programs 2 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Rings around Saturn. Secret Code. Mindboggling. Silhouette. Memory Test. Metric conversion.
Description – Five games plus easy conversion between inches/feet/yards and centimetres/metres.

Cassette G3: Super Programs 3 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Train Race. Challenge. Secret Message. Mind that Meteor. Character Doodle. Currency Conversion.
Description – Fives games plus currency conversion at will – for example, dollars to pounds.

Cassette G4: Super Programs 4 (ICL)
Hardware required – ZX81.
Price – £4.95.
Programs – Down Under. Submarines. Doodling with Graphics. The Invisible Invader. Reaction. Petrol.
Description – Five games plus easy conversion between miles per gallon and European fuel consumption figures.

Cassette G5: Super Programs 5 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Martian Knock Out. Graffiti. Find the Mate. Labyrinth. Drop a Brick. Continental.
Description – Five games plus easy conversion between English and continental dress sizes.

Cassette G6: Super Programs 6 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Galactic Invasion, Journey into Danger. Create. Nine Hole Golf. Solitaire. Daylight Robbery.
Description – Six games making full use of the ZX81's moving graphics capability.

Cassette G7: Super Programs 7 (ICL)
Hardware required – ZX81.
Price: – £4.95.
Programs – Racetrack. Chase. NIM. Tower of Hanoi. Docking the Spaceship. Golf.
Description – Six games including the fascinating Tower of Hanoi problem.

Cassette G8: Super Programs 8 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £4.95.
Programs – Star Trail (plus blank tape on side 2).
Description – Can you, as Captain Church of the UK spaceship Endeavour, rid the galaxy of the Klingon menace?

Cassette G9: Biorhythms (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – What are Biorhythms? Your Biohythms.
Description – When will you be at your peak (and trough) physically, emotionally, and intellectually?

Cassette G10: Backgammon (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Programs – Backgammon. Dice.
Description – A great program, using fast and efficient machine code, with graphics board, rolling dice, and doubling dice. The dice program can be used for any dice game.

Cassette G11: Chess (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Chess, Chess Clock.
Description – Fast, efficient machine code, a graphic display of the board and pieces, plus six levels of ability, combine to make this one of the best chess programs available. The Chess Clock program can be used at any time.

Cassette G12: Fantasy Games (Psion)
Hardware required – ZX81 (or ZX80 with 8K BASIC ROM) + 16K RAM.
Price – £4.75.
Programs – Perilous Swamp. Sorcerer's Island.
Description – Perilous Swamp: rescue a beautiful princess from the evil wizard. Sorcerer's Island: you're marooned. To escape, you'll probably need the help of the Grand Sorcerer.

Cassette G13: Space Raiders and Bomber (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £3.95.
Programs – Space Raiders. Bomber.
Description – Space Raiders is the ZX81 version of the popular pub game. Bomber: destroy a city before you hit a sky-scraper.

Cassette G14: Flight Simulation (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £5.95.
Program – Flight Simulation (plus blank tape on side 2).
Description – Simulates a highly manoeuvrable light aircraft with full controls, instrumentation, a view through the cockpit window, and navigational aids. Happy landings!

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Cassette E1: Fun to Learn series – English Literature 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Novelists. Authors.
Description – Who wrote 'Robinson Crusoe'? Which novelist do you associate with Father Brown?

Cassette E2: Fun to Learn series – English Literature 2 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Poets, Playwrights. Modern Authors.
Description – Who wrote 'Song of the Shirt'? Which playwright also played cricket for England?



Cassette E3: Fun to Learn series – Geography 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Towns in England and Wales. Countries and Capitals of Europe.
Description – The computer shows you a map and a list of towns. You locate the towns correctly. Or the computer challenges you to name a pinpointed location.

Cassette E4: Fun to Learn series – History 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Events in British History. British Monarchs.
Description – From 1066 to 1981, find out when important events occurred. Recognise monarchs in an identity parade.

Cassette E5: Fun to Learn series – Mathematics 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Addition/Subtraction. Multiplication/Division.
Description – Questions and answers on basic mathematics at different levels of difficulty.

Cassette E6: Fun to Learn series – Music 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Composers. Musicians.
Description – Which instrument does James Galway play? Who composed 'Peter Grimes'?

Cassette E7: Fun to Learn series – Inventions 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Inventions before 1850. Inventions since 1850.
Description – Who invented television? What was the 'dangerous Lucifer'?

Cassette E8: Fun to Learn series – Spelling 1 (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £6.95.
Programs – Series A1-A15. Series B1-B15.
Description – Listen to the word spoken on your tape recorder, then spell it out on your ZX81. 300 words in total suitable for 6-11 year olds.

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Cassette B1: The Collector's Pack (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Collector's Pack, plus blank tape or side 2 for program/data storage.
Description – This comprehensive program should allow collectors (of stamps, coins etc.) to hold up to 400 records of up to 6 different items on one cassette. Keep your records up to date and sorted into order.

Cassette B2: The Club Record Controller (ICL)
Hardware required – ZX81 + 16K RAM.
Price – £9.95.
Program – Club Record Controller plus blank tape on side 2 for program/data storage.
Description – Enables clubs to hold records of up to 100 members on one cassette. Allows for names, addresses, 'phone numbers plus five lots of additional information – eg.type of membership.

Cassette B3: VU-CALC (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Program – VU-CALC.
Description – Turns your ZX81 into an immensely powerful analysis chart. VU-CALC constructs, generates and calculates large tables for applications such as financial analysis, budget sheets, and projections. Complete with full instructions.

Cassette B4: VU-FILE (Psion)
Hardware required – ZX81 + 16K RAM.
Price – £7.95.
Programs – VU-FILE. Examples.
Description – A general-purpose information storage and retrieval program with emphasis on user-friendliness and visual display. Use it to catalogue your collection, maintain records or club memberships, keep track of your accounts, or as a telephone directory.

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	E7: Inventions 1	50	£6.95	
	E8: Spelling 1	51	£6.95	
	B1: Collector's Pack	52	£9.95	
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